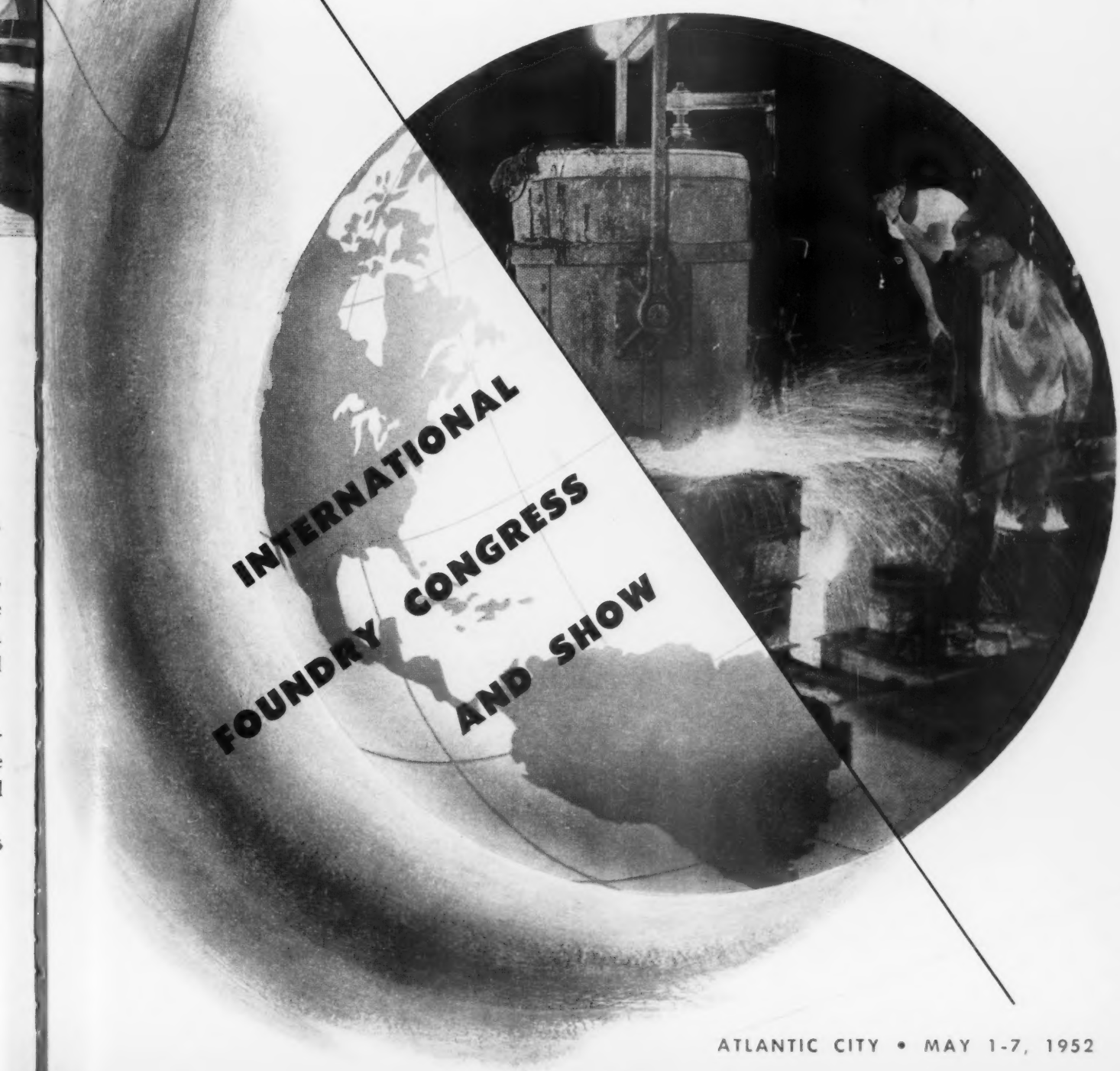
MAY 1952

FOUNDRY

. . . WHEREVER METALS ARE CAST

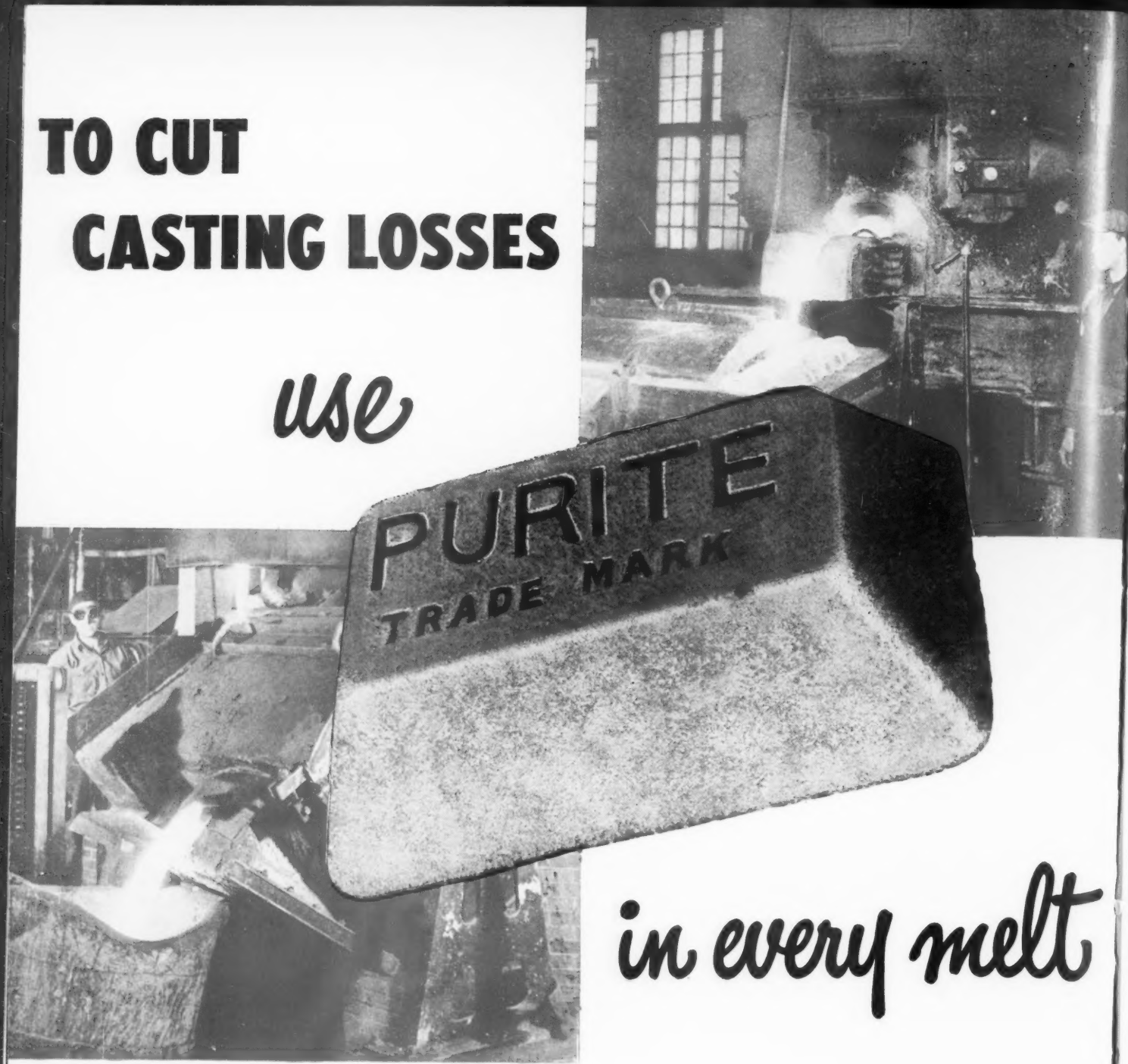
VK



ATLANTIC CITY • MAY 1-7, 1952

TO CUT CASTING LOSSES

use



in every melt

Every day, more leading foundries are using Purite *regularly* to cut casting losses and increase production of finished work. In these foundries, the use of Purite is standard operational procedure in every cupola charge. In the ladle too, Purite helps keep production high.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. **Purite produces a higher percentage of finished castings per ton of metal poured.**
2. **Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.**
3. **Purite gets to all the iron quicker.**
4. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
5. **Purite comes in 2-lb. pigs—no weighing or measuring required.**
6. **Purite is 100% pure fused soda ash—you do not pay for inert materials.**
7. **Purite does not crumble—no waste—no dust.**
8. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

Purite, the scientific flux for better melting and cleaner iron, is sold by all leading foundry supply houses in the United States and Canada. Mathieson Chemical Corporation, Baltimore 3, Maryland.

Mathieson
CHEMICALS

SERVING INDUSTRY AGRICULTURE AND PUBLIC HEALTH

TECHNOLOGY DEPT.

NISILOY

A POWERFUL, POSITIVE INOCULANT

Cuts Final Cost of Gray Iron Castings

by improving

MACHINABILITY, GRAIN STRUCTURE, UNIFORMITY

BENEFITS TO FOUNDRYMEN

Reduces Rejects—Used for structure control of cast iron, Nisiloy helps your foundry meet daily schedules for uniform lots of machinable gray iron castings.

Promotes Sound Castings — Diffusing rapidly throughout the melt, Nisiloy promotes a dense, close-grained product.

Curbs Breakage—Even where section thickness varies sharply, Nisiloy serves to eliminate chilled edges and surfaces, thus affording a tougher cast iron that resists breakage in shop handling.

No Scrap Problem—Containing only elements that dissolve freely in iron, Nisiloy permits remelting sprues and gates in any successive melt without risk of adding chill-forming elements.

Fewer Base Mixtures—Often a single base mixture may be used in the cupola to which Nisiloy is added in the ladle, with the consequent flexibility of pouring off thin or thick sectioned castings as desired.

For full information about this nickel-silicon alloy, one of the most useful products ever offered for improving machinability and structure of gray iron castings, fill in and mail the coupon below.

BENEFITS TO CASTING USERS

Excellent Machining Qualities—The dense, gray, machinable structure secured with Nisiloy reduces machining time, tool wear, rejects and costs.

Increased Wear-Resistance—The formation and distribution of finely divided random flake graphite accomplished with Nisiloy assures highly improved resistance to wear.

Improved Toughness—Nisiloy acts to eliminate hard, chilled areas . . . thus, the casting is thoroughly machinable in thin and thick sections alike and less sensitive to breakage in machining operations and general service.

Dependable Pressure-Tightness—The sound, homogeneous structure attained by inoculating with Nisiloy results in dense cast iron that provides substantially improved pressure-tightness.

EMBLEM OF INCO SERVICE
TRADE MARK

The International Nickel Company, Inc.
Dept. F, 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled:
"NISILOY" for GRAY IRON CASTINGS

Name.....*Title*.....

Company.....

Address.....

City.....*State*.....

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N.Y.

STILL THE *Best* OF THE BENTONITES!

Deposits of the finest Bentonite clay for foundry use are located near Upton, Wyoming. Here, on Federal-owned property, GREEN BOND is mined, dried and pulverized, to produce bonding clay of the finest quality and uniformity. From the very beginning, GREEN BOND has been the best of the Bentonites!

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MAY 1952

FOUNDRY

VOLUME 80—NUMBER 5

NBP CCA

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NEW EQUIPMENT DIGEST

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Business Staff—Page 408

THE COVER: The photo of a scene on a foundry pouring floor is reproduced here by courtesy of Texas Electric Steel Casting Co., Houston

SPECIAL ARTICLES

Editorial 121
World Foundrymen Seek Better Casting Practice 122
Congress Program 126
Foundry Show 132
Plant Inspection 136
Service to Industry Recognized in AFS Awards 138
Congress Committees 141
Magnesium Sand Foundry Technology 144
By W. C. NEWHAMS
Operating a Basic Cupola 150
By SAM F. CARTER
Versatile Coreboxes 154
By RICHARD H. HARWELL and J. H. SCHAUM
The Nonferrous Cleaning Room 156
By MARTIN G. DIETL
Electric Furnace Melting for Steel Castings 160
By JOHN HOWE HALL
Sand and Mold Handling Equipment (Part II) 162
By HENRY W. ZIMNAWODA
Steel Founders' Meeting 184
By FRANK G. STEINEBACH
Casting Molds for Steel Ingots 192
By PAT DWYER
Faster Hot Metal Handling 209
By W. M. GRIMES
Good Casting Design 224
By J. W. BRYANT
Man-To-Man on the Molder's Bench 248
By RALPH L. LEE
How To Mold a Large Aluminum Ring Casting 262
By FREDERICK H. PALMER

NEWS FEATURES

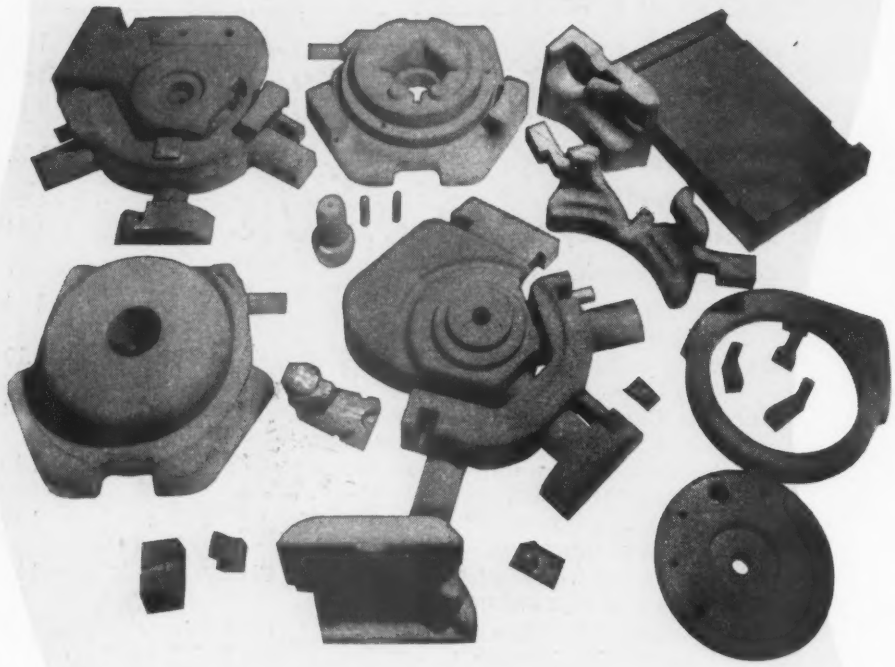
Around the Country 202
Calendar of Meetings 188
Foundry Group Activities 294
Industry Briefs 216
Late Foundry News 33
Men of Industry 174
News Views 200
Obituary 244
Statistics 197

DEPARTMENTS

ABC of Foundry Practice 291
Adventure of Bill By PAT DWYER 268
Advertisers' Index 408
Cupola Operation By BERNARD P. MULCAHY 242
Data Sheet 221
Foundry Developments 206
Ideas for Foundrymen 347
New Equipment and Supplies 344
Questions and Answers 168
Readers' Comment 116
Trade Publications 368
With the Editors 10

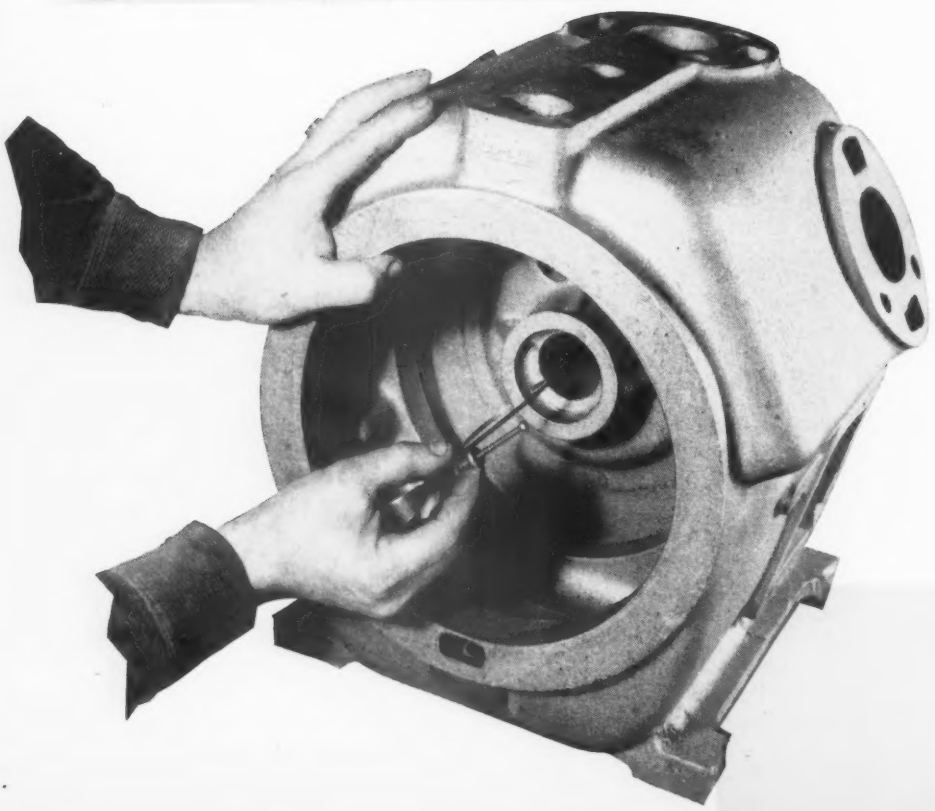
LINOIL uniformity

FOR "SUPERIOR" CORES



◀ • • • • Twenty-one small and medium cores used to mold compressor housing illustrated below. Cores are made to withstand 280#/sq. in. tensile strength.

FOR "SUPERIOR" CASTINGS



◀ • • • • • Casting for high pressure reciprocating air conditioning compressor. Interior surfaces must be true and free of flaws so that casting will withstand up to 900#/sq. in. pressure.

pays off at Superior Foundry, Inc.

CLEVELAND, OHIO, FOUNDRY HOLDS SCRAP FROM CORE FAILURE TO A MINIMUM

TOUGH ONES like this 21-core compressor housing are all in a day's work at this large production, jobbing foundry.

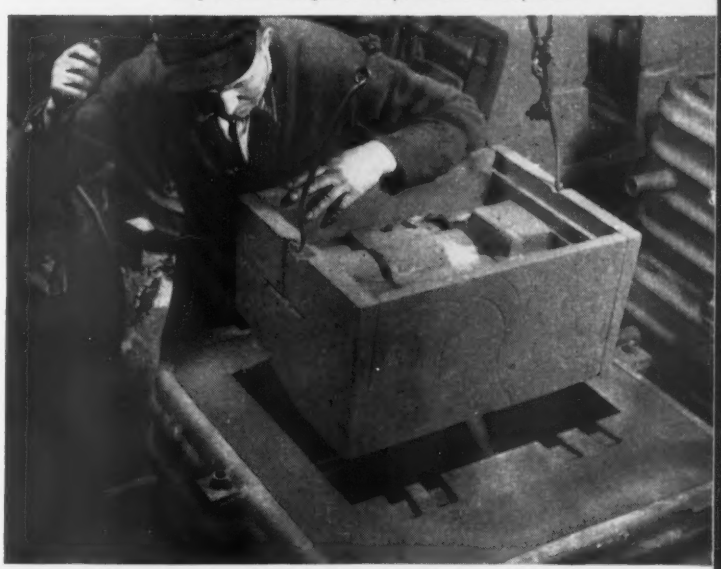
Admittedly, Superior likes complicated, multi-core jobs because their high-capacity core rooms have proven their ability to constantly produce cores as fast as they are needed on the molding floors.

The secret of their success is rigid foundry-wide standardization of methods, a policy which pays off, particularly in the control of sand mixtures. The result is phenomenal . . . rejects due to core failure are held to a minimum.

To maintain such a high degree of performance with widely-varied core sizes, Superior insists upon absolute uniformity of mixture ingredients. To help maintain these high standards, their core room supervisors rely on *uniform* LINOIL.

Why not test LINOIL in your sand lab or let an ADM engineer check your mixture. Our laboratories are at your disposal at all times.

"Sea" of tractor transmission case cores: example of the larger cores produced at Superior.



Complicated core assembly for lathe gear box is lowered into drag.

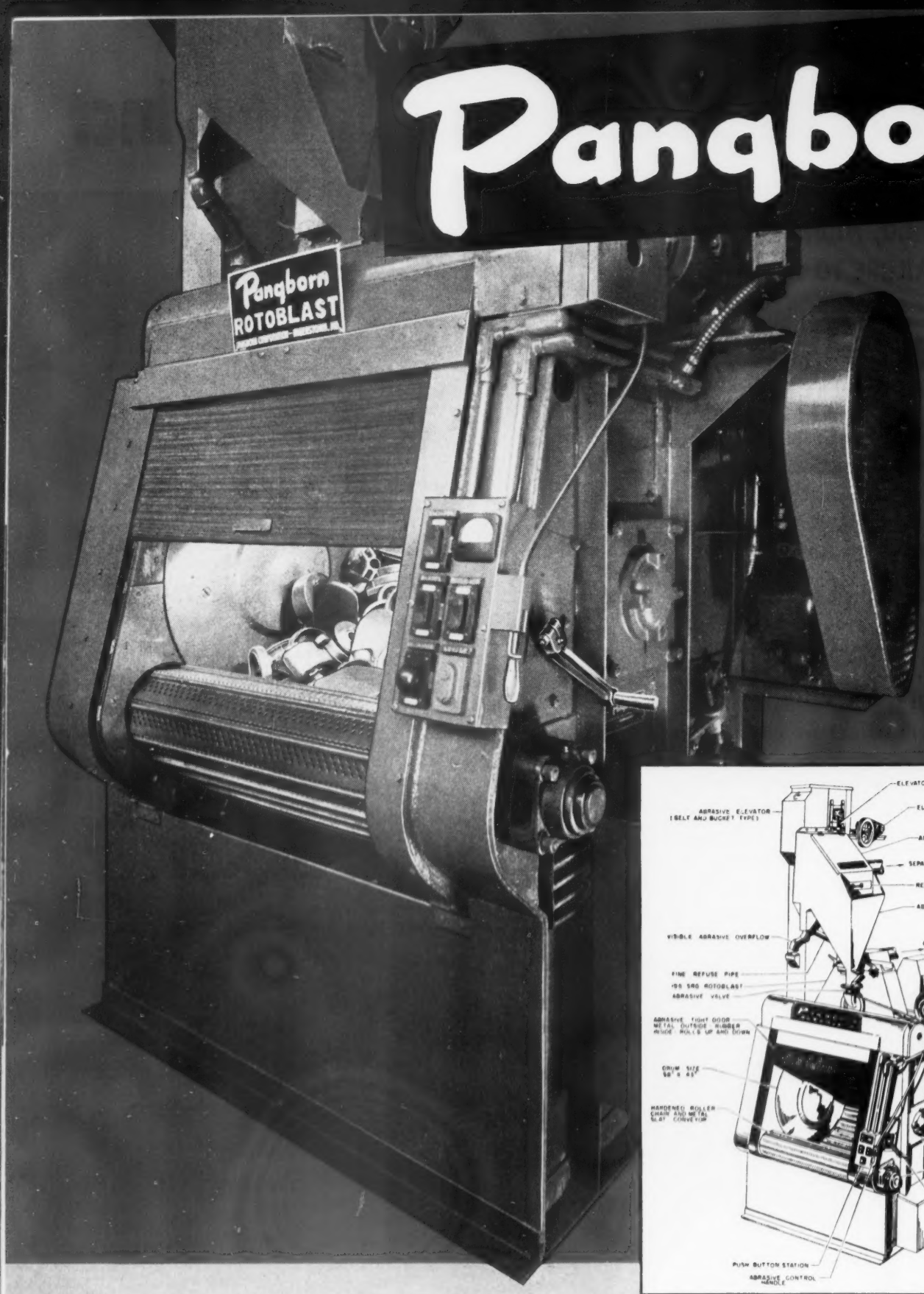
Have you heard about the New LINOIL 700 Core Oils?

Here are the facts: No matter what core oil you are now using, you can replace it with one of the newly-developed LINOIL 700 Series and get greater tensile strengths *at a lower cost.* The LINOIL 700 core oils are easy to work with, too. They're proving to be the best core oil buy in the history of the foundry industry. Ask your LINOIL man about the "700 Series"—or write for further information.

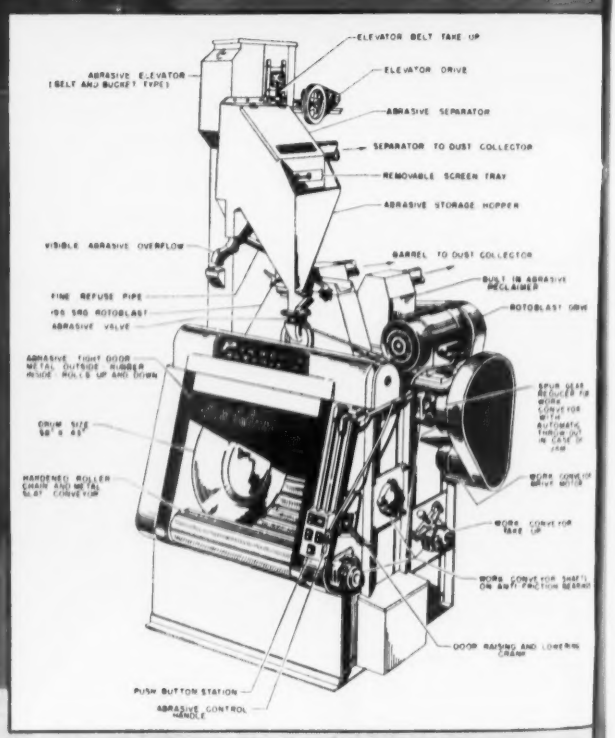
ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th STREET • CLEVELAND 2, OHIO

Pangborn®



For detailed descriptions of these outstanding features, see column at right.



Premier Showing—Atlantic City, N. J., May 1-7, 1952

International Foundry Congress, Booth 1733

See new barrel—and other machines—in operation

announces a NEW ROTOBLAST® Barrel

NEW Airless Barrel has many outstanding features

- *A Batch Cleaning Barrel* of advanced design that uses the famous ROTOBLAST® cleaning efficiency to give higher production at lower cost.
- *Work Conveyor* will not clog. Hardened steel chain with special metal slats designed so no aperture will pinch work.

  Drives through V-Belt to Spur Gear-Reducer mounted directly on work conveyor shaft—simple—effective—safe.

  Take-Up is on bottom shaft where weight of conveyor makes it easier to adjust.
- *Automatic Throw-Out Torque Arm* protection disengages the barrel drive in case of jams. Works in both loading and unloading directions.
- *Abrasive-Tight Door and Housing* keeps abrasive within machine, permits economical use of the newer types of abrasives.
- *Abrasive-Tight Door.* Woven wire mesh construction backed with vulcanized rubber. Rolls up compactly when door is opened. Slides on rollers in mechanized labyrinth. Always protected against abrasive action and tumbling castings by heavy rubber curtain.
- *Cleaning and Reclaiming System*—new—constantly removes all sand and debris, continuously maintaining full cleaning potential of abrasive.
- *Work Loader*—quick acting—double cables for safety—positively delivers entire load to machine.
- *Control Panel*—push button type—centrally located.
- *Two Sizes Now Available*—6 cu. ft. and 12 cu. ft. capacity. Other sizes on drawing boards.
- *Minimum Floor Space and Head Room*
  6 cu. ft. capacity—6′ 8″ deep x 6′ 0″ wide x 13′ 9⅞″ high.
  12 cu. ft. capacity—7′ 9″ deep x 9′ 7″ wide x 14′ 6″ high.

MEMBER FEMA

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

Win a $1000 U.S. Bond (Series E) for Naming NEW Barrel!

Here's your chance to win a $1000 Series E United States Savings Bond—just by submitting a winning name for the new Pangborn ROTOBLAST Barrel announced in this ad. It's new—it'll be on display for the first time—and in operation—at the International Foundry Show in Atlantic City, May 1-7. Take a good look at its features—check its advantages—then give it a name, using the handy entry blank below. Don't miss this chance to win a $1000 Bond—send in as many names as you can.

CONTEST RULES

- The name selected must be suitable for Trademark Registration. (Any name too close to names already in use would not be suitable.)
- Any person residing in the continental United States may submit entries—except employees and the families of employees of the Pangborn Corporation and its various agencies.
- No limit to the number of names you may submit.
- In case of duplication of winning name, the one bearing the earliest postmark will be declared the winner.
- The company need not use the name submitted even when the prize is awarded.
- No entries can be returned, and all entries become the sole property of the Pangborn Corporation.
- Entries must be postmarked not later than midnight, May 24, 1952.
- Decision of the judges will be final.

MAIL THIS COUPON—FILL IN DETAILS

PANGBORN CORPORATION, 1400 Pangborn Blvd, Hagerstown, Md.

My suggestion[s] for the name of the new Pangborn Barrel is [are]: .....

.....

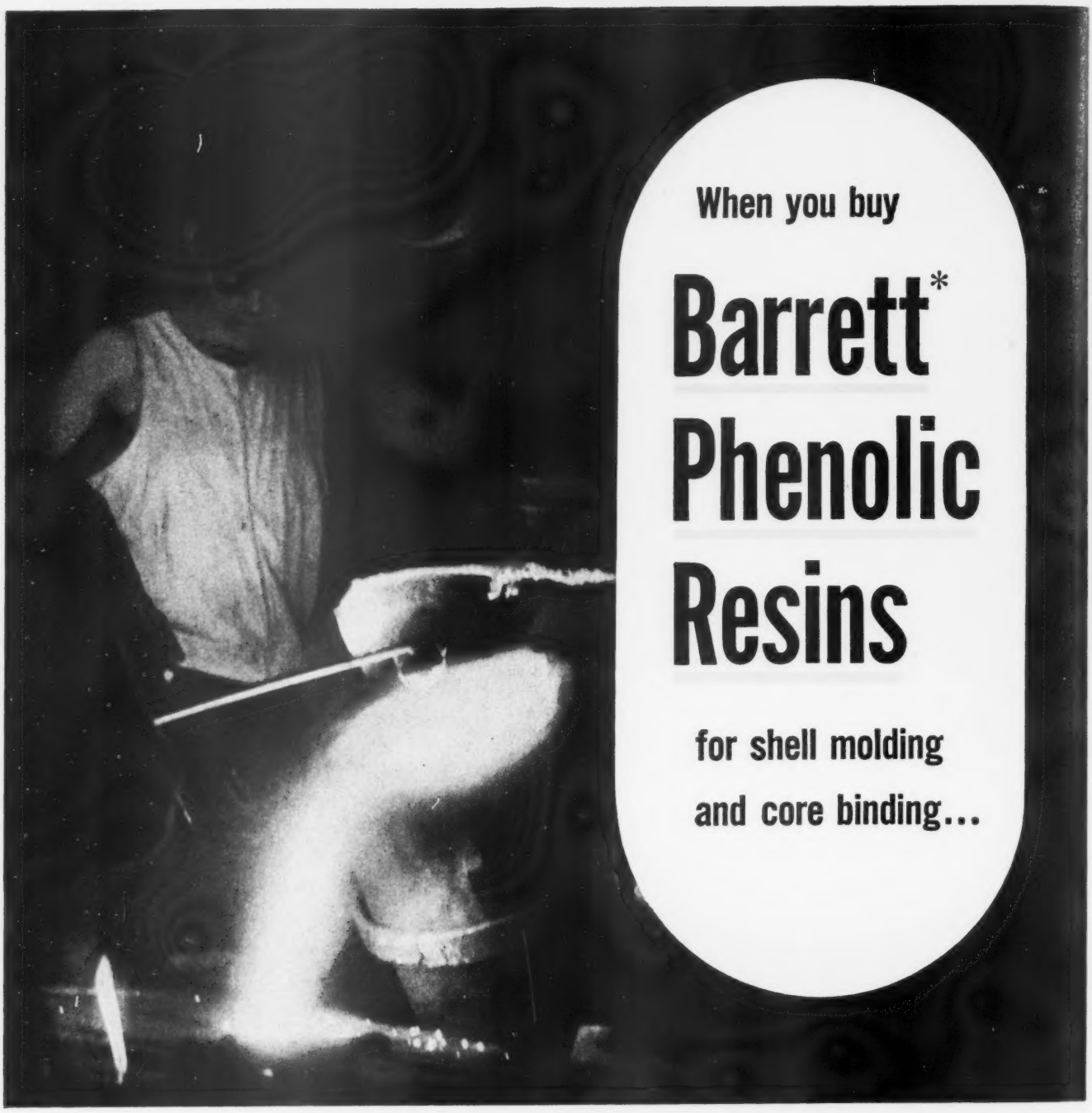
My Name .....

My Occupation .....

Street Address .....

City ..... Zone ... State .....

My Company is .....



When you buy

Barrett* Phenolic Resins

for shell molding and core binding...

Barrett's basic position in raw materials and Barrett's modern production processes are backed by almost a century of experience in chemical research and development. This is your assurance of uniform formulation at a high level of quality . . . a prime consideration to every business embarking upon the use of the shell molding process.

You get better castings at lower cost

You get:
- *Thin, lightweight shells*
- *Castings with superior finish*
- *Closer tolerances*
- *Molds and cores of uniform high quality*

You save:
- *Materials—less scrap, less sand*
- *Time—less machining*
- *Manpower—less handling*
- *Money—in every way*

Barrett is Basic

Barrett

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

*Reg. U. S. Pat. Off.

The Fast Way is the Cheapest Way to Make Cores

YOU PAY NO PREMIUM for speed. In fact, you get bonuses all the way. First, you cut handling time. Here's how: In conventional core making practice, cores are placed on a collecting rack; they are then removed and placed in an oven. The hot, smoking cores are removed by asbestos gloved workers and placed on a cooling rack. From there they go to storage.

Using a *Foundromatic* dryer — core makers simply place the green cores on the moving belt of the dryer. In a few minutes they come out — cool enough to handle with bare hands and ready to use . . . a big saving in handling and baking time!

Next, you cut up to 60% fuel cost. All the heat goes into the core — none into the room. Warmup time is short and this new *Foundromatic* dryer can be turned off when it's not being used.

In addition, core quality is improved. Over-baking of cores is impossible . . . burning of fins or thin sections is ended.

Cores that will pass through an aperture 36 inches wide and 13 inches high can be dried in the *Foundromatic* sand core dryer. For details, call your nearby Allis-Chalmers District Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Foundromatic is an Allis-Chalmers trademark.

THE CORE BOX

Questions and Answers About Dielectric Sand Core Drying

1. Do I need an electronic engineer to help me with the *Foundromatic* dryer?

No. Once equipment is installed and operating, any personnel can be quickly trained to follow simple operating instructions.

2. How long will tubes last?

Tubes have an estimated life of 5000 hrs.

3. How much maintenance is there?

Very little. Periodic replacement of tubes; oiling of rollers, and conveyor and blower motors.

4. Why is oven separate from heater?

To eliminate possibility of evaporated moisture being deposited on heater parts causing arcing, and to simplify installation and maintenance.

5. Can capacity be increased by adding another heater?

Yes. Simply add heater with minor oven changes.

6. How does the core dry?

By passing high frequency currents through the moist sand the molecules are set in motion and the resultant friction generates sufficient heat to drive off the moisture from the center to the outside.

7. What about collapsibility?

Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

8. Can core wash be eliminated?

In many cases, yes. The resin forms an atmosphere conducive to smooth castings.

9. Does the *Foundromatic* core dryer use power when empty?

No. Industrial heaters inherently deliver no power unless material is between the electrodes.

10. Why are rubber or fabric belts used?

Arcing is reduced, cores are given a smoother ride, and the low loss material requires no heat.

ALLIS-CHALMERS
MILWAUKEE 1, WIS.
Send me new 8 page Bulletin 15B7306B.

Name .....

Title .....

Company .....

City ..... State .....

A-3559

ALLIS-CHALMERS

This belt ran over 2 years at 500° F.

Imperial Sahara Belts are unsurpassed for handling hot materials

On July 27, 1949 this conveyor belt was placed in service at the Reading Plant of American Chain and Cable Co., Inc. For 2 years, 3 months and 26 days it ran continuously, 24 hours a day, 5 days a week . . . handling hot shakeout with a temperature of about 500° F. During this time production was accelerated and equipment operated at top speed.

What's your belting problem?

Such service records are not unusual for Imperial's Sahara Belting. If you use belting to handle high-temperature materials, it will pay you to let our engineers submit their recommendations on new installations or replacements. Imperial Belting always costs less to use because it's engineered specifically for the job to be done.

Made of 37½-ounce tight woven duck, with special impregnation and insulation, *Standard Sahara* handled materials up to 300° F.; *Insulated Sahara,* up to 450° F.; *Super Insulated Sahara,* up to 600° F. Imperial's inner-locked stitching positively prevents ply separation. Write for Data Sheet 47-8 and price list.

Imperial BELTING CO.

1755 S. KILBOURN AVE., CHICAGO 23, ILL.

Engineered Belting—
The Right Belt for Each Job

With the EDITORS

INTERNATIONAL FLAVOR: Although this department goes to press well ahead of the main editorial section, those pages devoted to the various features of the 1952 International Foundry Congress and Show were rounding into shape as this is written. We hope that after you have studied the nearly 25 pages of information on the many convention activities, you may gain a much better idea of the magnitude of the three-ring circus to be staged in Atlantic City May 1 to 7. In many ways it looks like a record breaker. It is the first time since 1915 that the society has selected the eastern resort for the annual meeting, and the first time since 1934 that an International Congress has been held in the United States. For some reason, an International Congress has a flavor all its own—one which will be remembered for many years to come by those in attendance.

—o—

Everybody Goes: Checking the list of FOUNDRY staff members who will shove off for Atlantic City late in April tends to prove the sweeping prognostications on a record convention attendance which are emanating from society headquarters in Chicago. Practically everyone in the editorial and business departments has found an excellent excuse to justify a week at the seashore, so that the offices in Cleveland will be almost deserted. Editorial staff members attending will include Frank G. Steinebach, William G. Gude, Edwin Bremer, Pat Dwyer, Robert H. Herrmann, Virginia B. Harms and Virginia C. Taylor from Cleveland; Ben K. Price from New York; and Erle F. Ross from Chicago. Business staff members will include Russell C. Jaenke, George A. Pope, J. M. Lathrop, A. L. Klingeman, G. R. Ebersole, David D. Gibbs, Mary Jane Kimpel and Bettie Thompson from Cleveland; J. F. Ahrens from New York; and A. W. Johansen and R. Z. Chew Jr. from Chicago. In addition, Earl L. Shaner, chairman, and George O. Hays, president, of the Penton Publishing Co., will attend.

—o—

From London: Because this is an International Congress, Vincent Delport, European manager of FOUNDRY, and Mrs. Delport are coming over for the affair. The Delports are accompanying the English party as far as New York, and are spending a week at the home office in Cleveland and a few days in Chicago before the congress. Vincent Delport is well known among foundrymen throughout Great Britain and the Continent, and has many friends in the United States. Since 1924 he has attended every major foundry congress in Europe to report on these activities for FOUNDRY. He is a past president of the London Branch of the Institute of British Foundrymen and for years has represented the AFS on the International Committee of Foundry Technical Associations. His writings and committee activities have contributed much to the development of a better understanding among foundrymen of the two continents. Of course, all of us on FOUNDRY are very happy that the Delports will be in the party at Atlantic City.

—o—

At the Show: FOUNDRY has booth No. 1520, located near the main entrance off the boardwalk in Atlantic City's large Convention Hall. Won't you drop in for a visit? We can provide comfortable chairs, a pleasant outlook and good company. We will be watching for you!

—o—

Dazzling: Two years ago this department had Harry Richey prepare a drawing of the FOUNDRY booth with the famous characters, Bill and Pat, asking you to come on in to see us. We might have done something like that this time, but Harry is off on a Florida vacation. Nevertheless, we do want to tell you that the booth, which was located near the center of the fire at the recent ASTE show at Chicago, has been entirely repainted and refurnished. New drapes, new upholstering, and cleaned rugs will give a shiny, bright appearance that may be dazzling to behold. So we hope you will be watching for us.

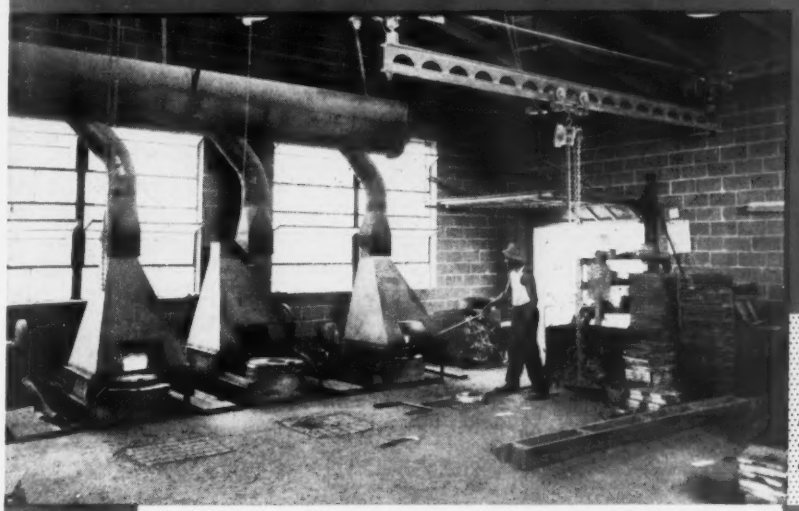
—o—

Cover: Just a special word of commendation to Artists Robin Allen and Don Cadot for the beautiful cover that graces this preconvention issue. We also want to thank the Texas Electric Steel Castings Co., Houston, Tex., for permitting us to reproduce the colored photograph of the pour-

(*Concluded on page* 12)

"ON THE RECORD"

CRUCIBLE *Melting*



THE MODERN METHOD!

Three of the four oil-fired furnaces with No. 60 Crucibles, in the new quarters of Central Brass & Aluminum Company of St. Louis, Mo. Crucible capacity 200 lbs. brass of 60 lbs. aluminum. Note roll-back fume hoods and excellent housekeeping.

Crucible melting belongs in the up-to-date, modernized non-ferrous foundry as shown in the illustration of an old-established company moved into new quarters.

Crucible melting completes the picture of overall efficiency and economy required to produce high quality castings in a highly competitive market.

WRITE FOR CRUCIBLE MELTERS' HANDBOOK. MAILED FREE.

CRUCIBLES FOR FLEXIBILITY

CRUCIBLE MANUFACTURERS ASSOCIATION

27 WILLIAMS ST., NEW YORK 5, NEW YORK

VISIT THESE BOOTHS AT ATLANTIC CITY AT THE 1952 CONVENTION MAY 1 to 7

JOSEPH DIXON CRUCIBLE CO.
Booth No. 1525

ROSS-TACONY CRUCIBLE CO.
Booth No. 331

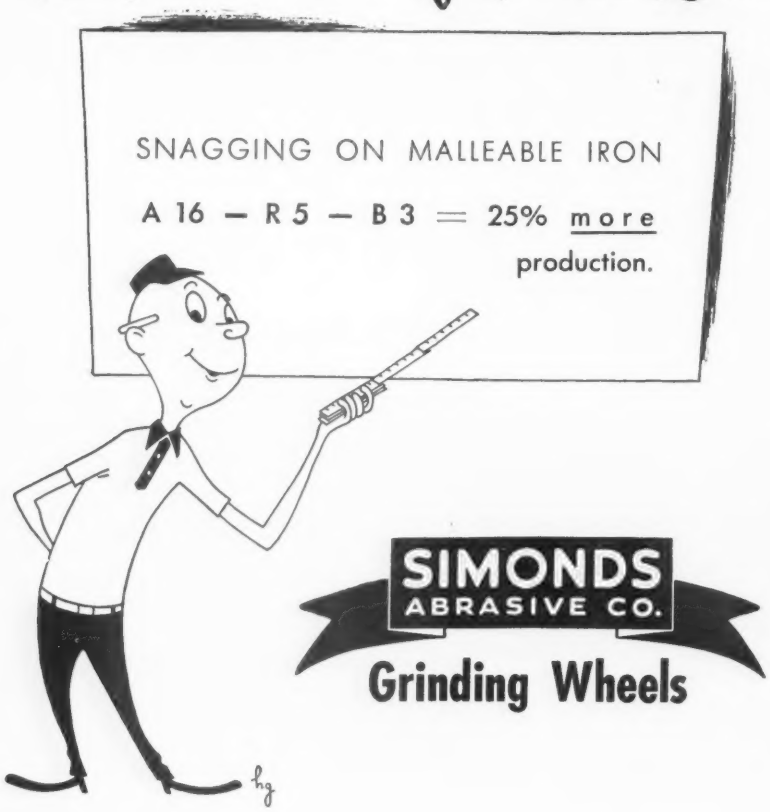
LAVA CRUCIBLE-REFRACTORIES COMPANY
Booth No. 512

VESUVIUS CRUCIBLE COMPANY
Booth No. 802

AMERICAN REFRACTORIES & CRUCIBLE CORPORATION
Booth No. 711

ELECTRO REFRACTORIES & ABRASIVES COMPANY
Booth No. 1435

Here's how the Grinding Department figures it...



That 'formula' sure paid off in one foundry. What does it mean? Simply this: a Simonds Abrasive Company grinding wheel—specification A16-R5-B3—boosted production 25%. Why? Because this wheel is accurately specified for the job it had to do. This is true of all Simonds wheel specifications. They're listed in our free data book, along with details on our complete line of grinding wheels, mounted wheels and points, segments and abrasive grain—plus information on how you can get Simonds wheels specially made for out-of-the ordinary jobs. Write for it. Also name of your nearby distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

ing scene. This photograph in four colors first appeared on the cover of an exceptionally fine new catalog of the Texas company.

—o—

Ideas for Foundrymen: If you have not taken advantage of the regular feature, "Ideas for Foundrymen", page 347 this issue, you are missing a good source of valuable technical and practical information on materials and machines for the production of castings.

—o—

Is It? While the item probably has been published before, it does seem worth mentioning that many in Washington now are referring to the WSB as the Wage Stimulation Board.

—o—

Deserves a Hand: Charlie Wilson, recently resigned director of the Office of Defense Mobilization, walked into the dining room of a Washington hotel a few nights after the resignation and received a standing ovation that lasted over 15 minutes. Those who have the welfare of the nation at heart regret exceedingly that, as a matter of principle, Charlie was forced to resign. The defense effort lost much.

—o—

Changes Coming Up: Speaking of Washington, cherry blossoms, tulips and pansies in the White House lawn and the face saving moves in this election year, one cannot help but feel, after a visit to NPA in the GAO building, that the defense organization is beginning to fall apart at the seams. Thousands of people continue to go through the motions, but it is doubtful if their heart is in the task. We expect to see many personnel changes around the defense agencies in the months immediately ahead.

—o—

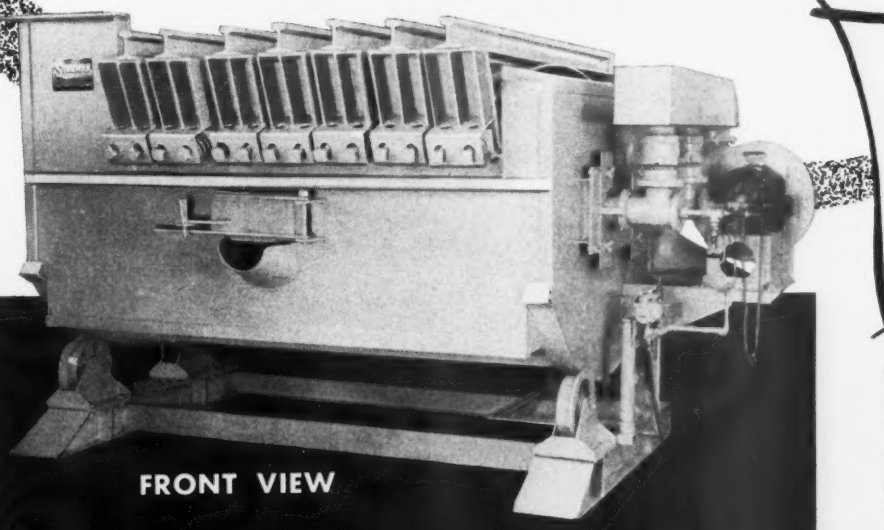
Honored: On Wednesday, Mar. 12, Secretary of Commerce Sawyer and the Business Advisory Council for the Department of Commerce held a luncheon to honor "the business men who have rendered service to the United States government as employees without compensation in time of national emergency." We are pleased to report that Thomas Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh; William T. McCargo, Carborundum Co., Niagara Falls; N. Y.; and Edgar F. Gore, Metals Division, Bohn Aluminum & Brass Corp., Detroit, were among the business men receiving certificates of service from the National Production Authority. Congratulations to these men on receiving this honor for a job well done.

F.G.S.

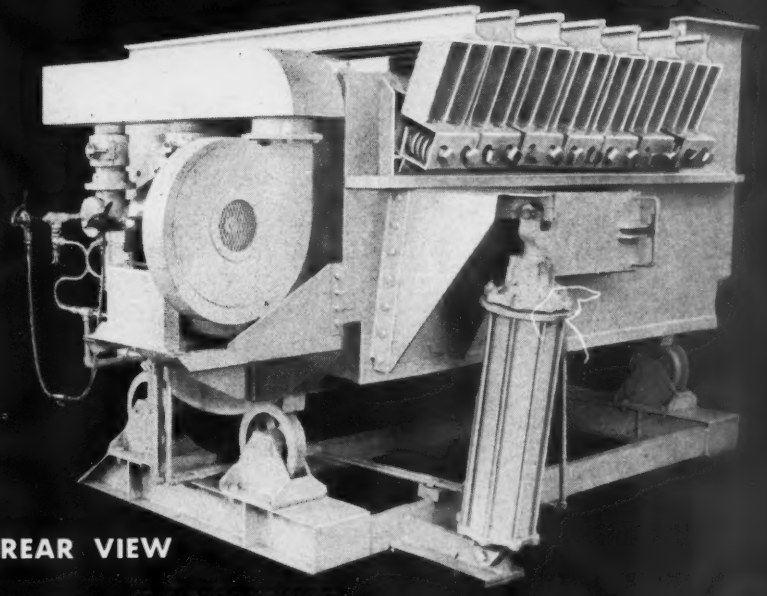
Another NEW STROMAN

REVERBERATORY FURNACE FOR COPPER ALLOYS or IRON!

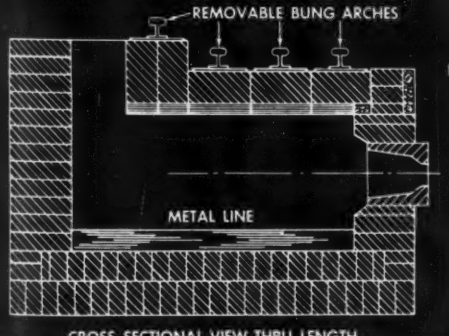
The Most Economical Furnace Ever Made to Handle Capacities from 400 to 10,000 pounds per heat.



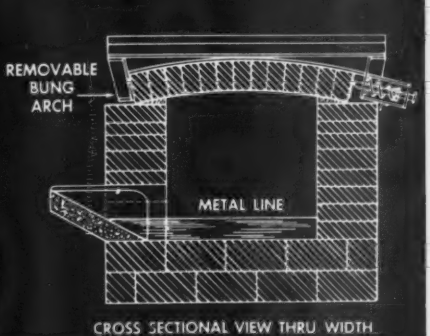
FRONT VIEW



REAR VIEW



CROSS SECTIONAL VIEW THRU LENGTH



CROSS SECTIONAL VIEW THRU WIDTH

Stroman "JC" Reverberatory Furnaces are built on the same basic ideas as the "air furnace" except that it is smaller and tilts instead of taps to pour . . . MELTING TIMES are the lowest known, ranging from 15 minutes to 2½ hours according to size of furnace and charge. It is excellent for COPPER BASE ALLOYS of low zinc content (containing not over 7% zinc). For such alloys, no more economical method has ever been devised for handling, melting, maintenance, charging, pouring and fuel consumption . . . and you can switch from one alloy to another without contamination. Castings produced from the "JC" are of excellent grain structure and free from porosity. Metal loss is lowest of any other type furnace. IRON MELTING . . . These furnaces will bring cold charges of iron up to casting temperatures of 2800° F., or they may also be used as a holding furnace of metal from a cupola. The "JC" is also highly recommended for special heats as well as production work. It has a decided advantage over a cupola in that it can be used for 6 to 8 successive heats a day. Cupolas cast just once a day. This enables a foundry to operate in slow times as a full crew is not necessary for ample production. These furnaces are gas, oil or combination gas-oil fire. They are automatically tilted and handle their metal perfectly. For greatest speed of melting and utmost economy investigate the Stroman "JC" Reverberatory . . . it will open the door to greater profits for you.

Write for full information and specifications today.

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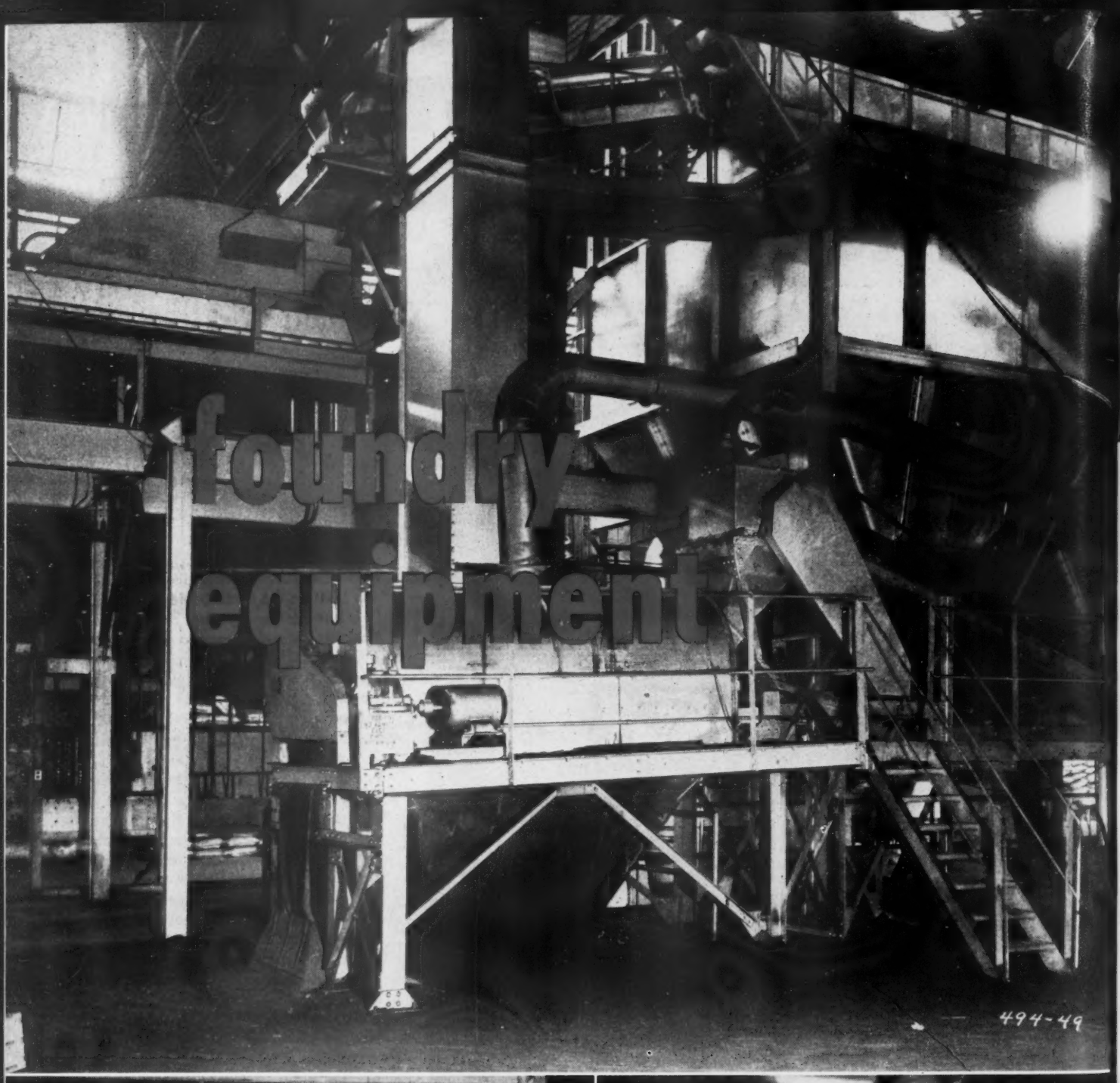
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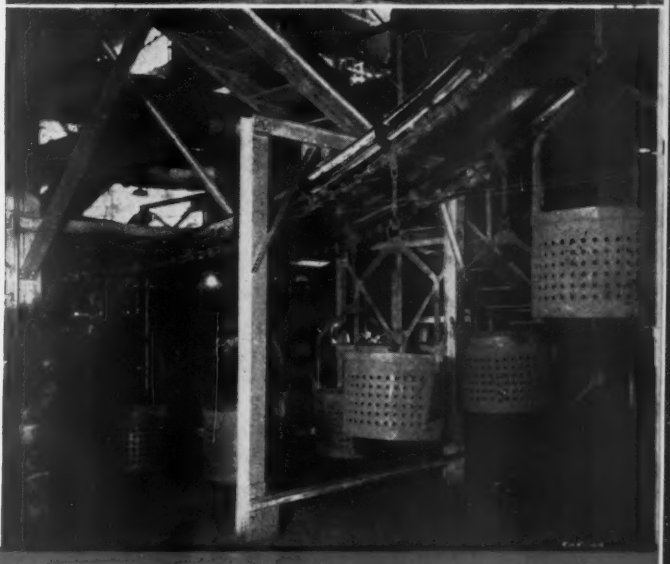

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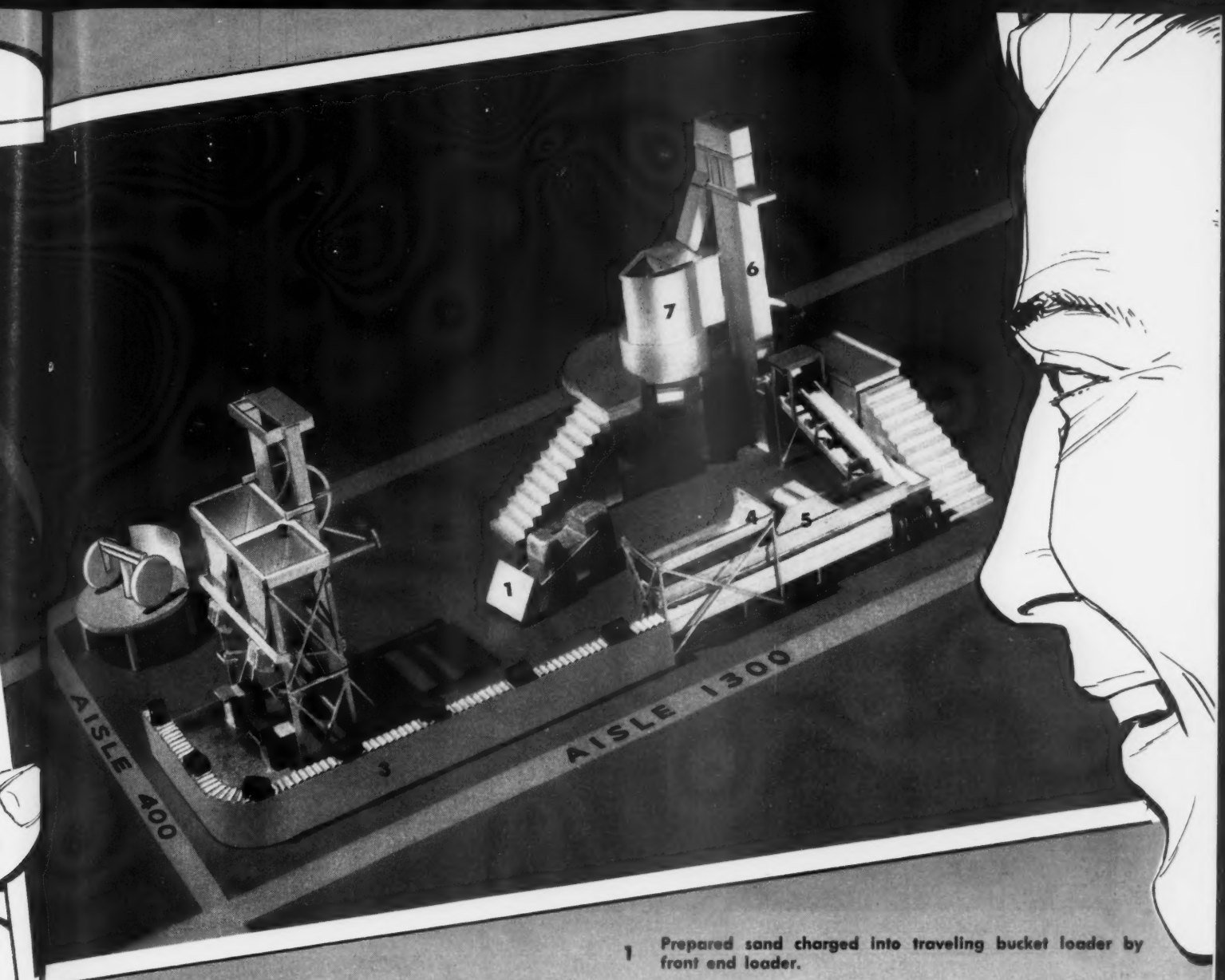
. . . featuring the New 2F and 3F SIMPSON Intensive MIX-MULLERS

Forming the "heart" of the National sand preparing system which will be in actual operation at the Foundry Show, will be a new 2F Simpson Mix-Muller, complete with National Cooling Hood, National Aerator, and Automatic Time Master Controls . . . demonstrating the way in which these modern, high capacity mullers are doing a bigger, better sand preparing job for foundries across the nation.

In addition, a 3F Simpson Mix-Muller will also be displayed, with crib sections cut away to show every detail of the new, efficient spring-loaded muller design and construction . . . most outstanding feature that has been developed since the inception of mulling.



ILLUSTRATED above is an actual scale model of the *National Utility Unit* which will be in full scale operation at the 1952 Foundry Show.

The unit will demonstrate how foundry sand preparation, molding and shakeout operations can be modernized with a minimum of mechanization, but with maximum flexibility for future addition or expansion.

This is your opportunity to see the new 2F and 3F Simpson Mix-Mullers and National Utility Unit in action . . . and remember, what you see can be engineered for *your* needs!

We'll be looking for you in Atlantic City, May 1-7.

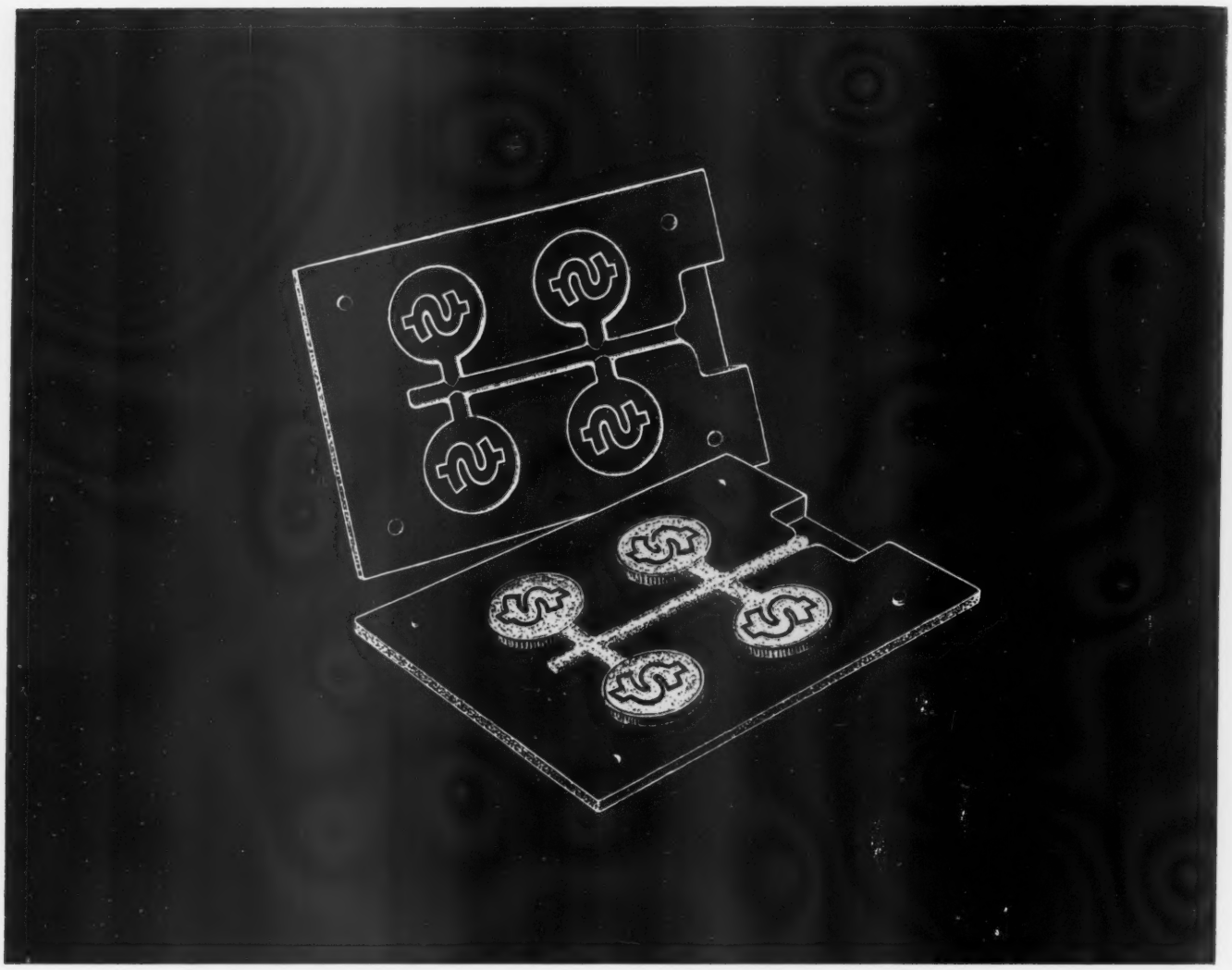
1. Prepared sand charged into traveling bucket loader by front end loader.
2. Bucket loader charges overhead molders hoppers which deliver sand to 2 molding machines.
3. Finished molds delivered to shakeout on roller conveyor.
4. Shakeout sand delivered to receiving hopper by front end loader.
5. Shakeout sand is automatically screened and magnetic refuse removed by screening and conveying unit.
6. Shakeout sand delivered by inclined belt and elevator to batch holding hopper over 2F Mix-Muller.
7. Preparing equipment consists of 2F Mix-Muller equipped with National Cooling Hood, Aerator and Automatic Time Master Controls, which will control charging of sand, water, binder, cooling and mixing cycle, and discharge of prepared sand through aerator. National Time Master operation will be visually demonstrated by means of a flashing light panel.

National Engineering Company

608 Machinery Hall Bldg. • Chicago 6, Illinois

SIMPSON *Intensive* **MIX-MULLERS**

Manufacturers and Selling Agents: For Continental European Countries — George Fischer, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney; for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.



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Thin-shell molds and cores, made of fine-grained sands bonded with BAKELITE Phenolic Resins, yield ferrous and non-ferrous castings that are almost pattern-smooth. Such castings lower production costs because they need only a minimum of finishing, for tolerances as close as .003 to .005 of an inch per inch can be achieved.

The light, smooth molds bring additional economies to foundry operation. Highly porous, they permit gases to escape freely. They are always accurately registered, with built-in guide pins and holes making allowance for mold shift unnecessary. Castings have no burnt-on sand. Since rejects are minimized, more good castings are obtained from each ton of metal poured.

Pattern wear is reduced, too, because tamping and vibrating of sand are eliminated. Molds have a uniform quality—they're strong, moisture-resistant, stable—with long storage life.

Saving time, effort, space, sand, and metal, the shell molding process deserves your consideration. For information about the BAKELITE Phenolic Resins especially developed for it, fill out and mail the coupon.

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Please mail my free copy of Booklet K-8, "BAKELITE Phenolic Resins for Foundry Molds and Cores."

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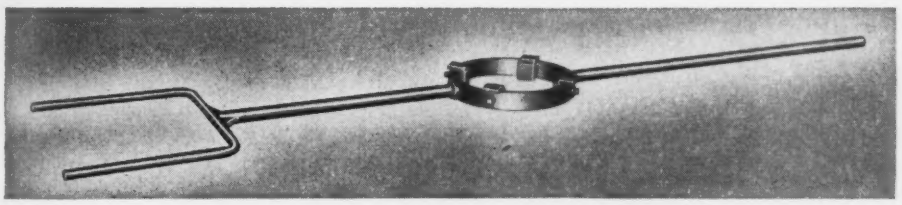
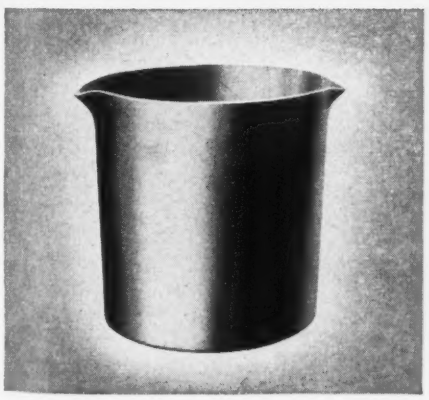
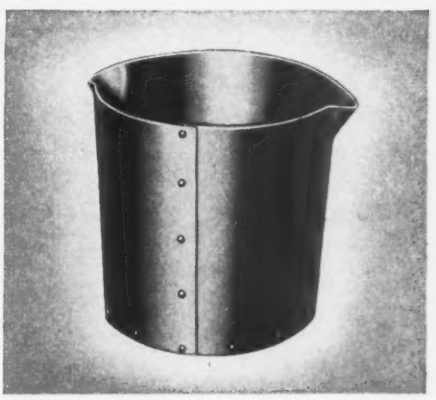


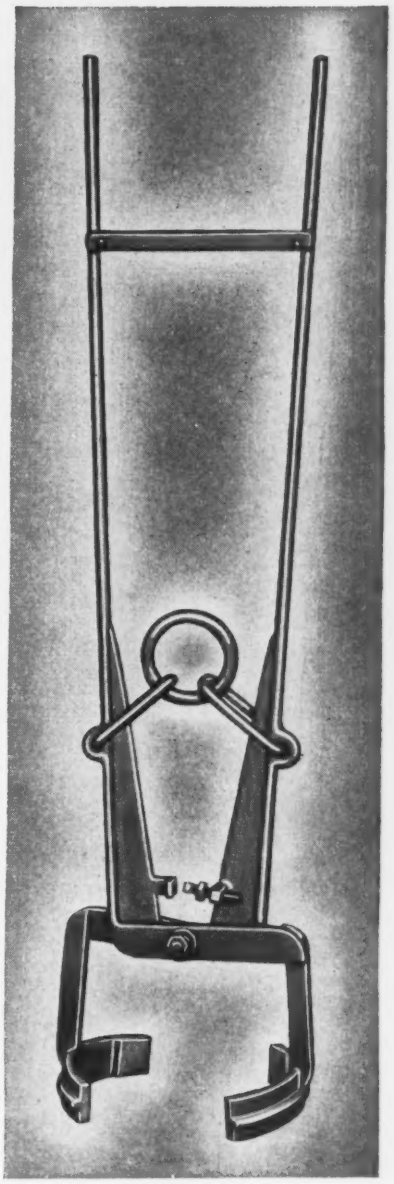
Industrial Equipment type 30CA single and adjustable ladle and crucible shank. Four-point suspension . . . easily adjustable . . . no springs . . . air cooled band. Fixed band types also available.



Industrial Equipment type 514 flat bottom welded steel ladle bowl. Available in almost any size or thickness.



Industrial Equipment 537 flat bottom riveted steel ladle bowl.



Type 72C crucible tongs. Adjustable. Four-point suspension. Claw types also available.

The above Industrial Equipment products, along with dozens of other types of bowls, shanks, tongs and ladles, are included in our latest catalog. *Write for your copy.*

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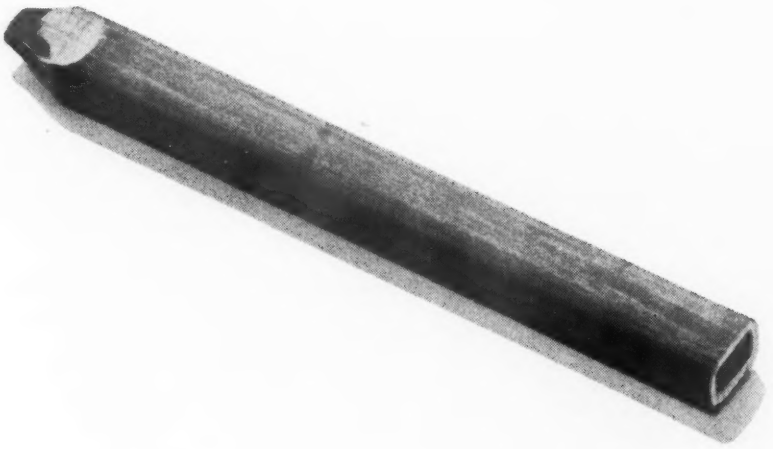
Bill — you can get smoother cores with Mogul!



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Kordek, the preferred dry bond for cores . . .

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Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

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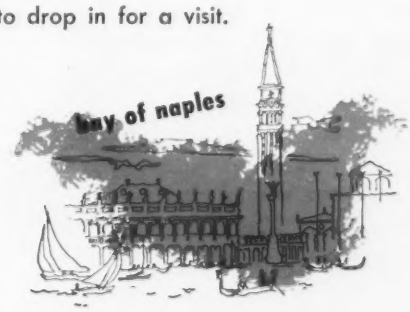

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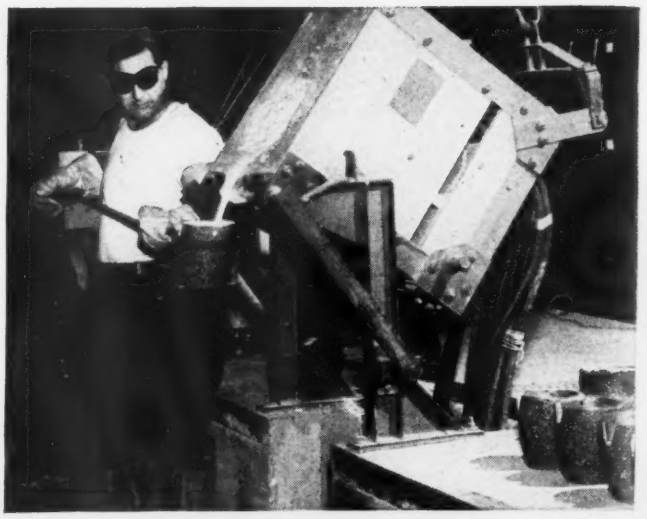

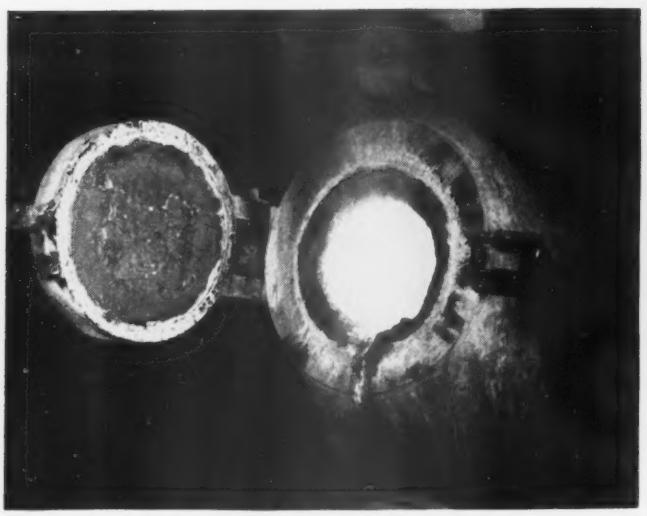

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A dense, easily workable, coarse grain cement, RC1188 is particularly suitable for ramming-in linings and for patching, and its very high refractoriness withstands temperatures up to 3050° F. Adaptable, easy to install and repair, it has high "green" strength, with long service life assured by excellent resistance to slag, flame and mechanical abrasion, spalling and cracking.

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NORTON FIRED SHAPES are available in the form of brick or segmental linings, in a variety of refractory materials for best results in non-ferrous metal-melting furnace applications. See your Norton Representative.

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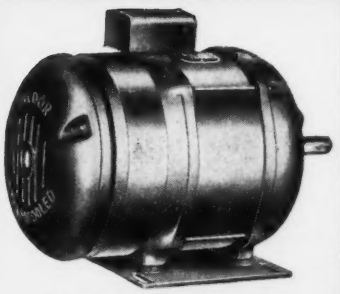
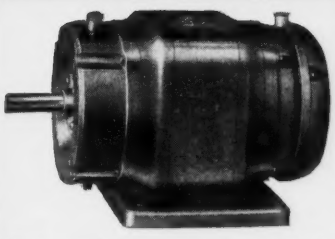
THESE *totally-enclosed* BALDOR MOTORS

CANNOT BECOME CLOGGED BY FOUNDRY DUST, DIRT or GRIT

THEY PROVIDE CONTINUOUS PRODUCTION WITHOUT "TIME OUT" FOR CLEANING



Streamcooled, round frame, 1/3 to 3/4 h. p., 1 phase, 3 phase and direct current.



Streamcooled face mounted; Single phase 1/3 to 7½ hp., Three phase 1/3 to 20 hp., Direct Current 1/3 to 3 hp.

Streamcooled, single phase, 3/4 to 7½ h. p.

Streamcooled, three phase 3/4 to 20 hp.

Arrows indicate the forced air movement over the entire exterior of the BALDOR Streamcooled motor frame.

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The reason Baldor totally-enclosed motors are non-clogging is simple enough: there is no air jacket or air duct to clog, for heat dissipation is accomplished by an outer-mounted fan (on the bell end of the motor) which sends a stream of forced air over the entire exterior of the motor (hence the trade name STREAMCOOLED).

The advantages are obvious: no down-time for cleaning even in locations where the air is full of dust, grit, lint, or foreign matter.

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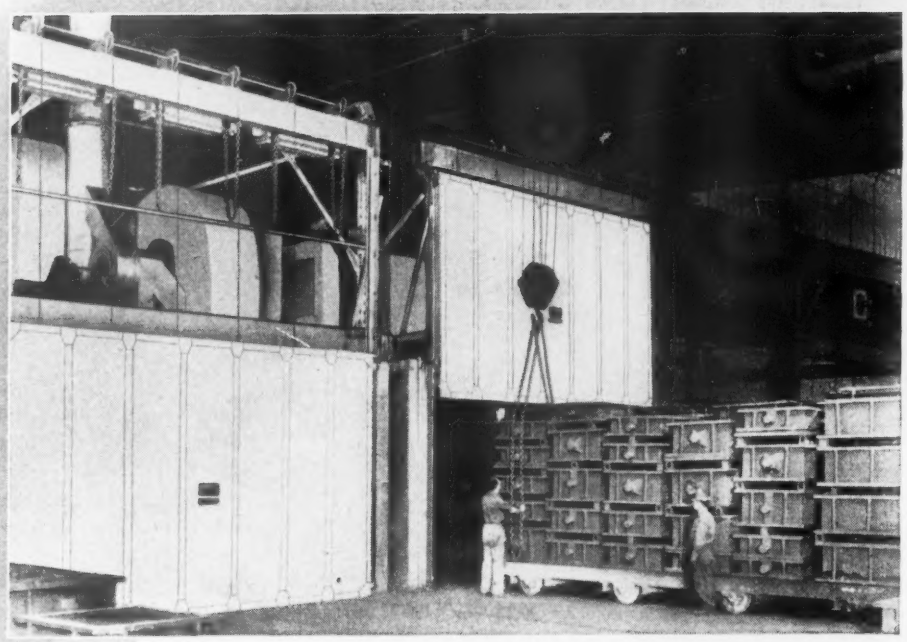
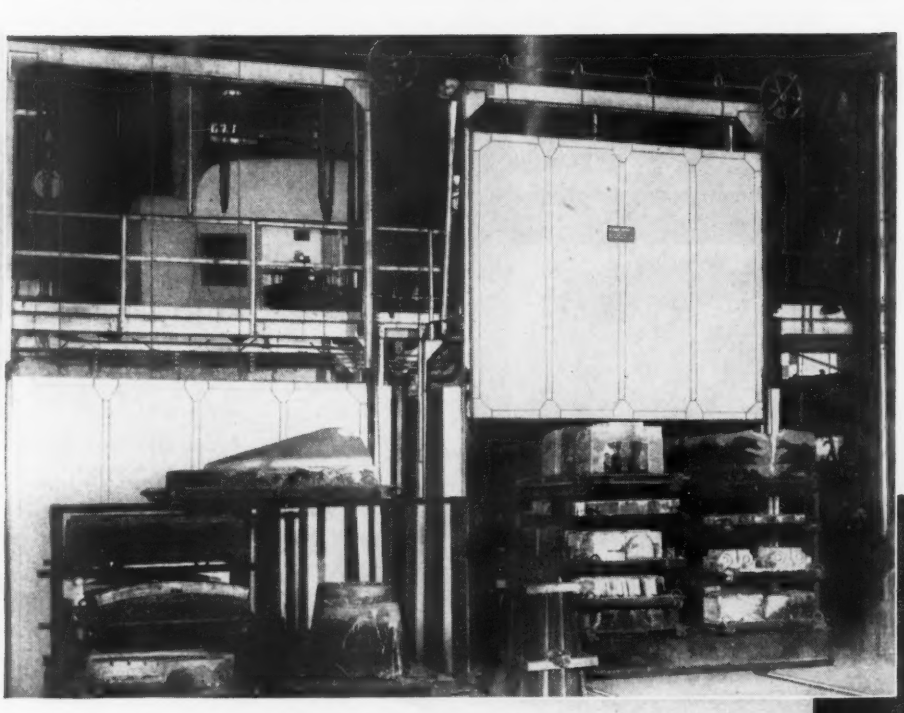


Coleman Car-Type Mold Ovens



Coleman Car-Type Core Ovens

OVENS
CORES AND MOLDS
any other method...

BAKING AND DRYING TIME REDUCED regardless of size and shape of cores and molds.

MOST EFFICIENT HANDLING METHODS for your type of work and plant conditions . . . eliminate delays and losses.

PERFECT CORE BAKING ends manpower and casting losses due to make-overs and rejects.

PERFECT MOLD DRYING for true-to-pattern castings and easy cleaning.

INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

HEAVY DUTY CONSTRUCTION for continuous dependable performance, economical operation, and minimum maintenance cost.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

SAVE BINDER. Proper core baking atmosphere and uniform temperature permit important savings in conventional binders.

USE HIGH SPEED CORE BINDERS. Coleman ovens have uniform temperature and accurate control to handle temperature-sensitive resins and pre-baked oils.

50 YEARS OF FOUNDRY OVEN SPECIALIZATION IN EVERY COLEMAN OVEN

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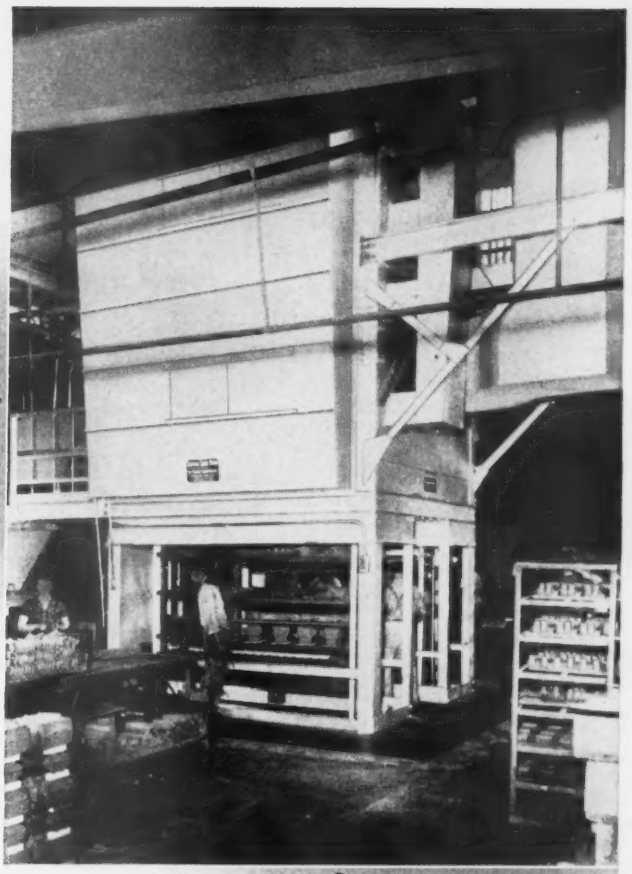
COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

Write for Bulletin 48



Coleman Tower® Core Oven

Coleman Transrack Core Ovens

THE FOUNDRY EQUIPMENT CO.

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WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

ADAMS CHERRY SNAP FLASK
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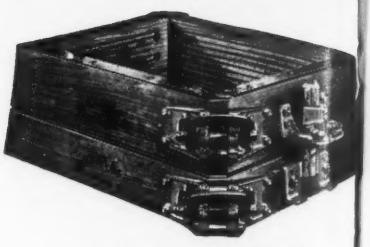
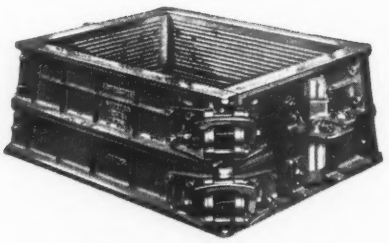
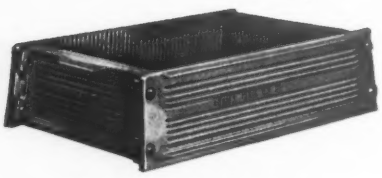


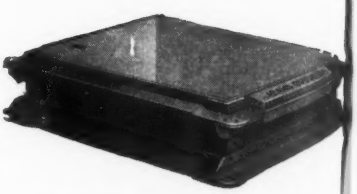
ADAMS CHERRY
EASY-OFF FLASK



ADAMS ALUMINUM
EASY-OFF FLASK



ADAMS JACKETS
Cast Iron or Aluminum



ADAMS STEEL JACKET

Boost Foundry Efficiency

ADAMS FLASK EQUIPMENT

VISIT OUR BOOTH 164

THE ADAMS

DUBUQUE,

MOLDING MACHINES . . . . . FLASK

With

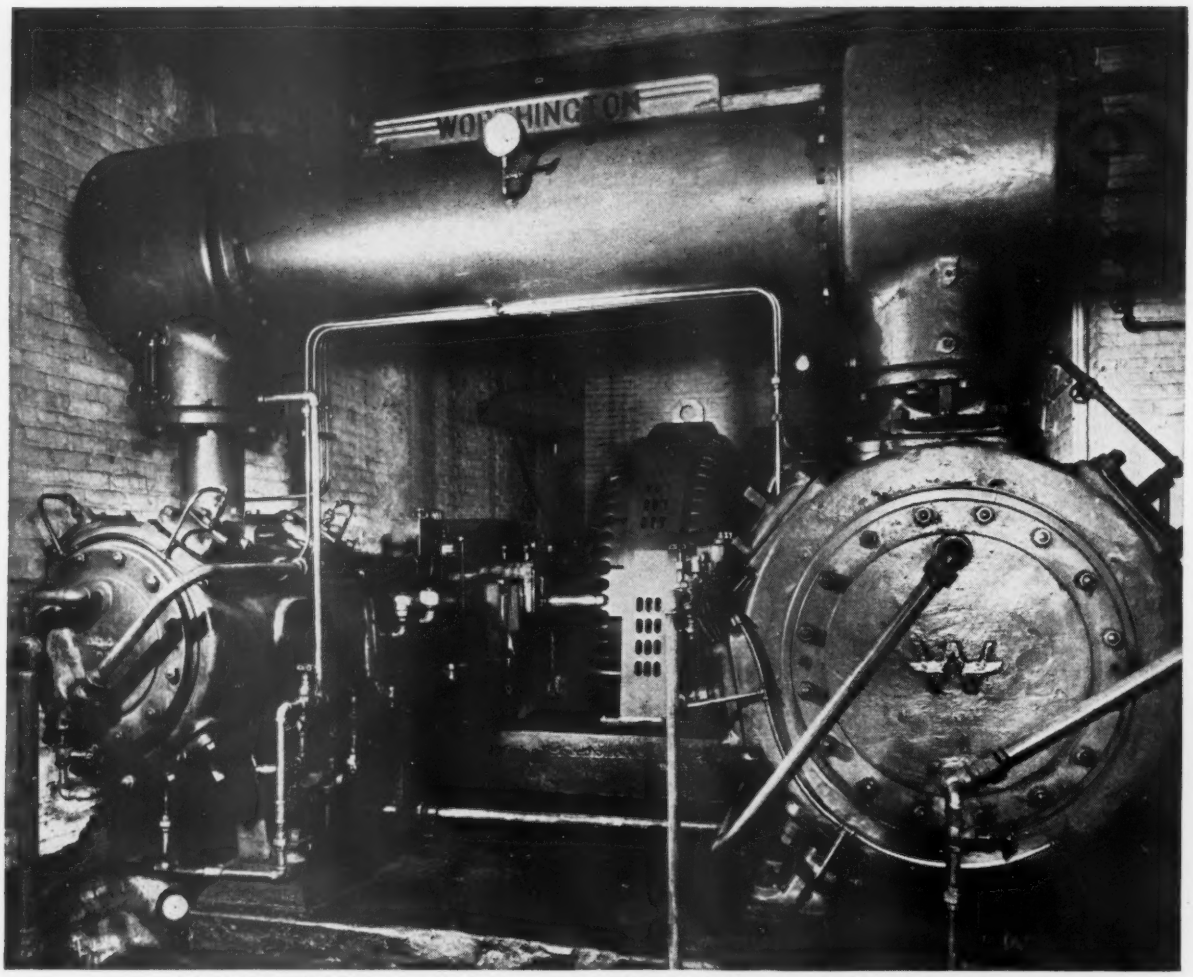
ADAMS MOLDING MACHINES

SEE OUR COMPLETE LINE

COMPANY

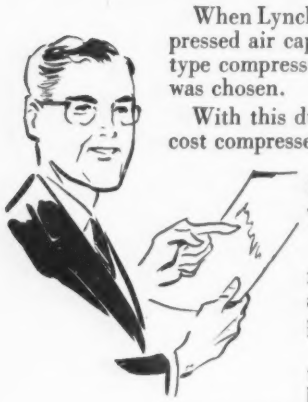
IOWA, U.S.A.

EQUIPMENT . . . . . *Established 1883*



Worthington DC-2 horizontal air compressor at Lynchburg Foundry Co., Lynchburg, Va.

It Saves Power Costs At Every Load



When Lynchburg Foundry Co. wanted additional compressed air capacity . . . more than its Worthington Y-type compressor could handle . . . a Worthington DC-2 was chosen.

With this duplex compressor, Lynchburg gets lowest-cost compressed air and longest compressor life.

LESS DEMAND ON MOTOR WHEN THERE'S LESS DEMAND FOR AIR

Five-step capacity control permits matching the pumping rate to the varying amounts of air required. This reduces power consumption at partial load.

Worthington's five-step capacity control governor is exceptionally sensitive because it performs *only pilot duty*. The actual unloading is done electrically and pneumatically. But the pumping rate is continuously under the *control* of the governor. With decrease or increase in demand, the governor causes the compressor to unload or reload in sequence.

Worthington's by-pass control also reduces operating temperatures, eliminating valve difficulties from carbon deposits, improving lubrication, and reducing cylinder wear.

Other features include Worthington's famous Feather* Valve (lightest, tightest, most efficient ever made) . . . and a high-efficiency intercooler which needs less water, less power, less attention.

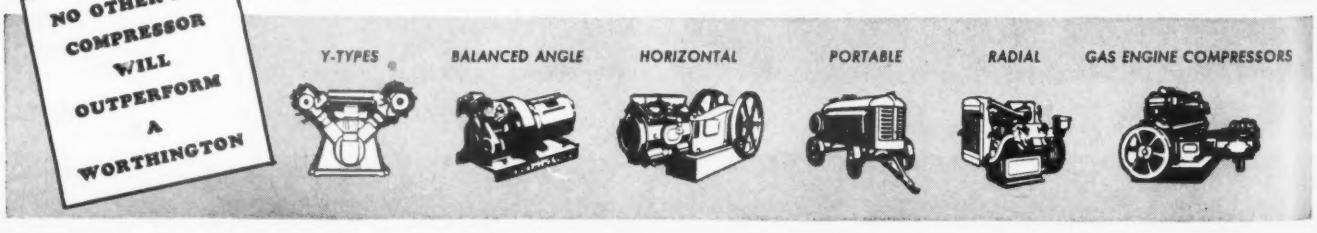
For more proof *there's more worth in Worthington*, write for Bulletin L-675-B1B to Worthington Pump and Machinery Corporation, Compressor Division, Buffalo 5, New York.

WORTHINGTON

NO OTHER AIR COMPRESSOR WILL OUTPERFORM A WORTHINGTON

*Reg. U. S. Pat. Off.

K.1.6



Triple Service

Goodyear Conveyor Cuts Belt Cost $413—while handling almost three times the tonnage of the previous belt

Ordinary 5-ply conveyors handling hot sinter at 200°-300° F. failed in three months or less because of heat, caustic attack on the belt and small drive pulleys. The best record was 23,545 tons before failure on the top cover.

Then the G.T.M.—Goodyear Technical Man—recommended a 3-ply Goodyear Style 6740 "Hot" Belt. It outlasted any other belt ever tried—served almost 9 months—handled 68,750 tons of material. This thinner belt gave closer control on the weighing device measuring out sinter as well—saved an estimated $413.44 ($6.08 per M tons) on belt costs alone!

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

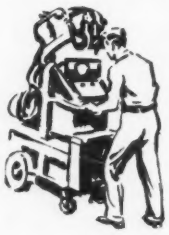
THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network

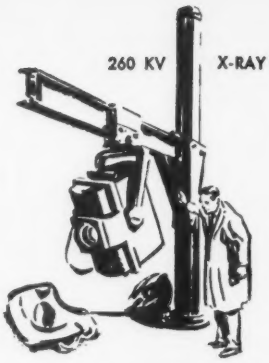
5 TO 50 KV INSPECTION UNIT

X-RAY DIFFRACTION UNIT

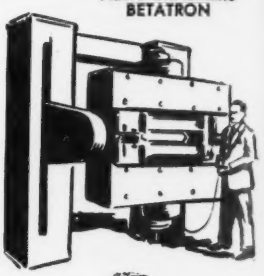
150 KV MOBILE X-RAY UNIT



260 KV X-RAY UNIT

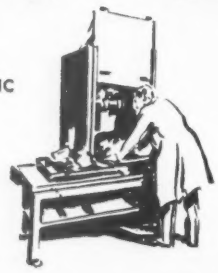


22,000,000 VOLT ALLIS-CHALMERS BETATRON

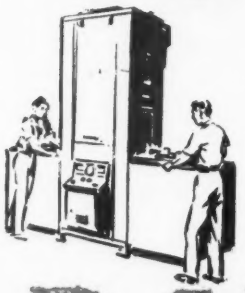


if it has to do

RAYPROOF RADIOGRAPHIC CABINET

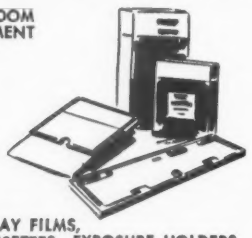


RAYPROOF X-RAY INSPECTION CABINET



with X-RAY

DARKROOM EQUIPMENT



X-RAY FILMS, CASSETTES, EXPOSURE HOLDERS

CHEMICALS, ACCESSORIES, SUNDRIES

LAYOUT PLANNING

MAINTENANCE SERVICE

it has to do with

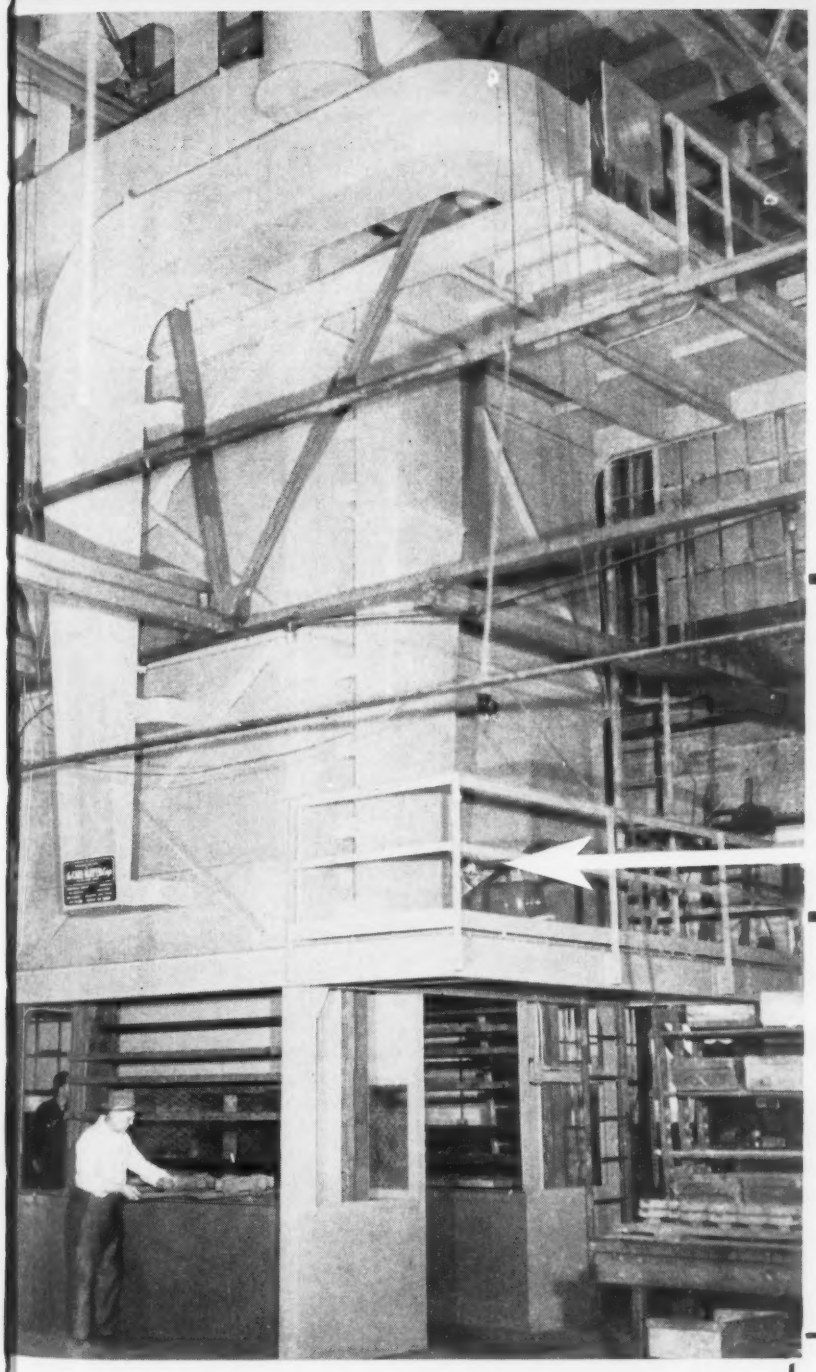
Picker x-ray

Picker *specializes* in x-ray, and x-ray only, covering the field like a blanket. *Whatever you need, we've got* . . . from a simple lead letter to a 22,000,000 volt betatron. To serve you, there are sales offices and service depots in all principal cities, staffed by skilled engineers prepared to cope with any x-ray problem promptly and with understanding. If you are now using x-ray, or are wondering whether you should, you can depend on Picker for objective technical counsel and efficient handling.

PICKER X-RAY CORPORATION 25 S. Broadway, White Plains, N.Y.

SALES OFFICES AND SERVICE DEPOTS IN PRINCIPAL CITIES OF U.S.A. AND CANADA

CARL-MAYER'S *Important Development* in VERTICAL CORE OVENS



Recent installation of Carl-Mayer Vertical Core Oven with combination gas and oil fired recirculating heating system, at G. & C. Foundry Co., Sandusky, Ohio

•

A few of our Vertical Oven Customers:

Aluminum Co. of America
Buick Motor Div. of General Motors Corp.
Cadillac Motor Div. of General Motors Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
G. & C. Foundry Co.
General Steel Castings Co.
Ingersoll Steel & Disc Div. Borg-Warner Corp.
Richmond Radiator Co.
H. B. Salter Co.
Union Brass & Metal Mfg. Co.
West Michigan Steel Castings Co.
A. C. Williams Co.

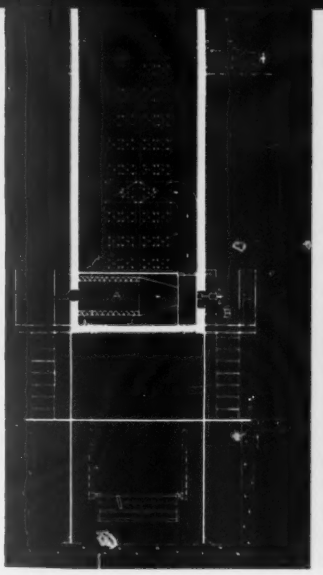


Fig. 1
NEW METHOD with heat fan inside oven.

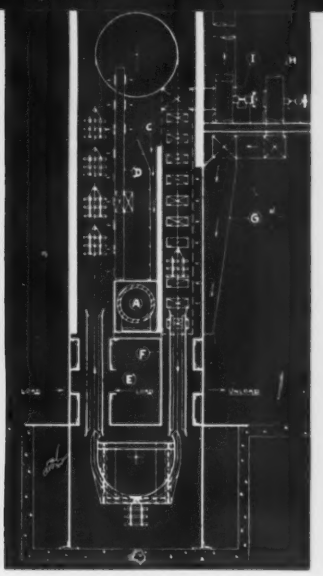


Fig. 2
Section showing conveyor travel thru pass, heating, cooling and exhaust system.

Vertical Ovens (Figs. 1 and 2) are by Carl-Mayer, using the universally adopted recirculating heating system with sealed combustion chamber located between the conveyor chains. Patent No. 2,257,180

EXCLUSIVE HEATING SYSTEM *pays off several ways!*

HEAT FAN INSIDE OF OVEN

- Saves platform space.
- Eliminates external heat duct, reducing heat losses.
- Placing heat fan *in* oven also reduces heat losses, resulting in high operating efficiency.
- By eliminating external heat duct and fan insulation, it reduces installation cost.
- There is no smoke as from external heat ducts.
- Oven appearance is greatly improved.

THIS IS BUT ONE OF THE REASONS WHY CARL-MAYER VERTICAL OVENS ARE THE CHOICE OF LEADING FOUNDRIES.

Other important features contribute to faster baking, lower fuel consumption, smaller core losses, safer operation, elimination of smoke, cooled cores at unloading position and reduced labor cost.

Write for Bulletins No. 141 and 350

ALL TYPES OF CORE, MOLD OVENS

Also other types of Industrial Ovens and Furnaces

• • •

THE CARL-MAYER CORPORATION

3030 Euclid Ave., CLEVELAND, OHIO

Backed by reputation and over 30 years' Experience

SEE SCHNEIBLE MULTI-WASH

ON DISPLAY AT
THE INTERNATIONAL FOUNDRY EXHIBIT
BOOTHS 1254 *and* 1353

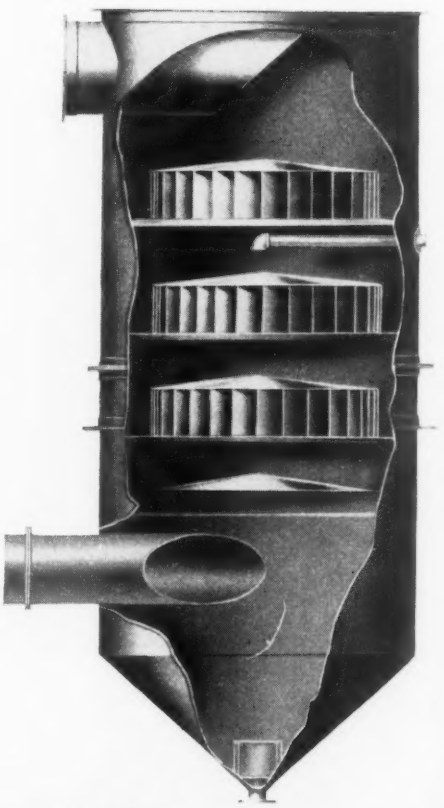
LATEST ADVANCEMENTS IN DUST AND SMOKE CONTROL FOR ALL FOUNDRY OPERATIONS

The Schneible Dust Collector display will be of interest to all foundry men. You'll see the principle of the Multi-Wash Collector demonstrated in actual operation through a transparent plastic shell and note the efficiency and the simplicity of construction.

You'll see a translite exhibit of the latest Schneible applications to many foundry operations.

You'll learn how the Schneible Multi-Wash System of Dust and Smoke control can clear up the atmosphere both inside and out for more production and better employee and civic cooperation.

Be sure to get the answers to your contamination control problems from Schneible at the show!



CLAUDE B. SCHNEIBLE COMPANY

P. O. Box 81 — North End Station — Detroit 2, Michigan

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

SCHNEIBLE

MANUFACTURERS • ENGINEERS • CONTRACTORS

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

Late Foundry News

APRIL 18, 1952

INVENTORY CONTROL: Recent changes in NPA regulations governing the size of consumers' inventories affect pig iron and gray and malleable iron castings. Inventory limitation on these items has been raised to 60-days' supply or a practicable minimum working inventory, whichever is less. Cast iron pressure pipe and fittings have been added to the list of materials subject to a practicable minimum working inventory limitation.

STEEL FOUNDRY EXPANSION: NPA recently told representatives of the steel castings industry that mobilization plans require a greater tonnage of castings than existing capacity can produce. A task group from members of the heavy steel castings industry is being appointed to explore the whole field of capacity, possible expansion, and methods of breaking bottlenecks to assure production and delivery of the most essential foundry products. Industry representatives have made it clear that further expansion of foundry facilities to make the larger castings can be carried out only with government funds.

FOUNDRY SURVEY: Copper Division of NPA is planning to conduct a nation-wide survey of brass and bronze foundry facilities. It would be similar to one made during World War II. The information, showing facilities by type and size of castings, type of material, equipment and personnel employed, would be made available to various government agencies, principally for use by the military branches and in considering applications for tax amortization certificates covering new facilities.

WOULD FREE ZINC: Primary zinc producers have asked NPA to revoke the order controlling allocation and use of the metal. This year's supply of primary and secondary zinc is placed at 969,000 tons, against estimated consumption of 933,000 tons. Heavier receipts from Mexico have boosted anticipated 1952 imports from 88,000 tons to 115,000 tons.

DRAB DRESS: Metalworking machines henceforth will be less dressy. To save labor machinery builders have been directed by NPA to use not more than one coat of primer or sealer, not more than two coats of paint, lacquer or enamel, and no filler except for spot filling of bad cavities.

CAR BUILDERS BUSY: Although freight car builders delivered 8159 new cars in March, against 7358 in February and 7011 a year ago, backlogs Apr. 1 totaled 115,854. March orders were for 5619 cars.

POINT 4: The State Department's Technical Cooperation Administration is sending 31 more technicians and administrative personnel on overseas assignments under the Point 4 Program. Nineteen will go to Latin America, ten to the Near East and South Asia, and two to Africa. While most of the group will specialize in agriculture, public health, education, housing, etc., five will work on industrialization. The latter includes Edwin W. Doe, author of the new book, *Foundry Work*, who will be concerned with foundry management and operation in Brazil.

NEW PRIORITY: To clear up bottlenecks in deliveries of component parts for military, atomic energy and machine tool projects NPA has created a new priority rating called B-5. Prime contractors on these top defense items may pass the rating down to subcontractors. Starting May 1 prime contractors may pass on the rating for authorized controlled materials. The B-5 priority is expected to continue in effect should CMP be dropped—an event regarded as not unlikely by this year-end.

HALF WAY THERE: Slightly over half of the facilities expansion program for defense production was in place as of Apr. 1, according to the Defense Production Administration. By the end of 1953 the program is expected to be 94 per cent completed. These figures are based on reports from nearly 5000 recipients of certificates of necessity issued as of Dec. 31, 1951. As of Feb. 25 DPA had approved 7188 applications for rapid tax write-off, representing a total proposed investment of more than $14½ billion. This included $31,474,000 for steel foundries, $23,463,000 for gray iron foundries, $11,505,000 for malleable iron foundries and $9,243,000 for nonferrous foundries.

FOUNDRY EXPANSION: Foundries on recent lists of approved certificates of necessity, and amounts certified, are: Eastern Malleable Iron Co., Naugatuck, Conn., $110,000; Unitcast Corp., Toledo, O., $459,000; Buffalo Brake Beam Co., Buffalo, $106,335; Pelton Steel Casting Co., Milwaukee, $127,800; Boston Electro Steel Casting Inc., Boston, $52,150; United States Steel Co., Braddock, Pa., (ingot molds), $4,397,000; Wheland Co., Chattanooga, Tenn., $750,000; Memphis Casting Works Inc., Memphis, Tenn., $28,568; James H. Beans Foundry Co., Martins Ferry, O., $96,500; Consolidated Iron-Steel Mfg. Co., Cleveland, $123,950; Brown Industries Inc., Sandusky, O., $68,352; Bonney-Floyd Co., Columbus, O., $25,828; Midwest Foundry Co., Coldwater, Mich., $75,000; Chicago Steel Foundry Co., Chicago, $126,500; Bigelow-Liptak Corp., Marshalltown, Iowa, $66,500; Alloy Steel & Metals Co., Los Angeles, $100,500. Union Mfg. Co., New Britain, Conn., $286,519; American Light Alloys Inc., Little Falls, N. J., $93,419; Superior Foundry Inc., Cleveland, $47,240; Youngstown Foundry & Machine Co., Youngstown, O., $226,422; U. S. Steel Co., Canton, O., $191,000; Standard Foundry Co., Racine, Wis., $270,524; Zenith Foundry Co., West Allis, Wis.,

$67,607; Peoria Malleable Castings Co., Peoria, Ill., $455,074; Brillion Iron Works Inc., Brillion, Wis., $267,360; Terre Haute Malleable & Mfg. Co., Terre Haute, Ind., $82,000; Belle City Malleable Iron Co., Racine, Wis., $130,471; Paxton-Mitchell Co., Omaha, Nebr., $67,486; Gra-Iron Foundry Corp., Marshalltown, Iowa, $52,845; Standard Brake Shoe & Foundry Co., Pine Bluff, Ark., $107,000.

PERSONALS: John M. Price, chairman, Ferro Machine & Foundry Inc., Cleveland, is expected to be appointed shortly to the post of chief of the Castings Section, Office of Price Stabilization, Washington . . . C. G. Hawley, Jeffrey Mfg. Co., Columbus, O., has been made chief of the Conveyor Section, Materials Handling Equipment Branch, NPA. Robert W. Scott, formerly with Hyster Co., Portland, Oreg., has been named chief of the Materials Handling Equipment Branch, succeeding J. H. Peritz, who has joined Clark Equipment Co., Battle Creek, Mich. . . . Swan Bergstrom, for the last six months director of the Metalworking Equipment Division, NPA, is returning to Cincinnati Milling Machine Co., of which he is vice president. He is succeeded at Washington by Ralph S. Howe, vice president, New Britain Machine Co., New Britain, Conn. . . . A. M. Ondreyco, recently plant manager, Vulcan Foundry Co., Oakland, Calif., and a national AFS director, has joined the Metals Division of General Metals Corp., Oakland.

APPRENTICE DEFERMENT: There is a better chance than during the last war that apprentices will be deferred by Selective Service. According to W. F. Patterson, director, Bureau of Apprenticeship, Department of Labor, a proposal for such deferment has been agreed upon by most government agencies having manpower and defense functions. The principle is similar to that underlying the college student deferment regulations.

MISCELLANY: General Metals Corp. is building a new $5 million plant for the production of heavy steel castings. The building will adjoin the company's existing steel foundry in Oakland, Calif. . . . A Senate bill would transfer ownership of the government magnesium foundry at Teterboro, N. J., to the Navy . . . Mystic blast furnace, Everett, Mass., closed for repairs in March, is expected to resume production early in May . . . Opposition of the city has killed a proposal by National Malleable & Steel Castings Co. to build a steel foundry at La Habra, Calif. . . . Nonferrous castings shipments jumped in January but trailed figures for a year ago. Brass and bronze total was 89,616,000 lb, aluminum 46,424,000 lb, magnesium 3,569,000 lb.

PRICES OF FOUNDRY METALS AND COKE

(As of Apr. 18, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.00-18.00
New River	21.30
Wise County	15.95
OVEN	
Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.80
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$54.50	$55.00
Birmingham	48.88	....
Buffalo	52.50	53.00
Chicago	52.50	52.50
Cleveland	52.50	52.50
Everett, Mass.	57.80	58.00
Fontana, Calif.	58.50	....
Geneva, Utah	52.50	....
Granite City, Ill.	54.50	54.90
Lone Star, Tex.	48.50	48.50
Neville Island (Pittsburgh)	52.50	52.50
Steelton, Pa.	54.50	55.00
Swedeland, Pa.	56.50	57.00
Toledo, O.	52.50	52.50
Troy, N. Y.	54.50	55.00
Youngstown, O.	52.50	52.50

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 19.00c. Secondary No. 12 alloy 19.50c Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.61½c, delivered.

ZINC: High grade 20.85c, delivered. Die casting alloy 23.65c-24.25c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

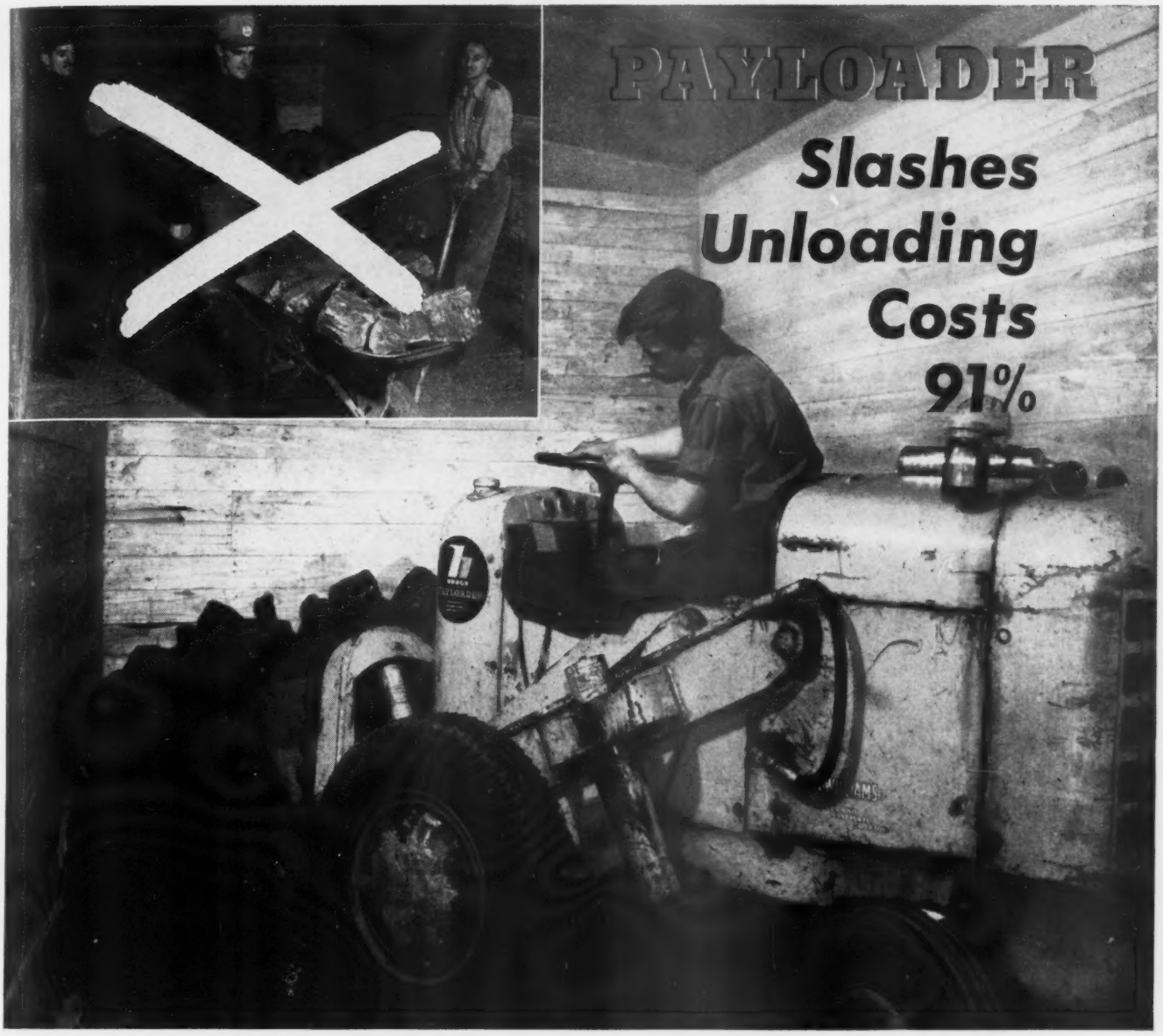
	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.



* A complete report on Timken's use of "PAYLOADERS" for bulk material handling is found in Vol. 1, No. 3 of INDUSTRIAL HANDLING. Copy of this is available for the writing. Literature on any of the "PAYLOADER" models is also available, without obligation: the 12 cu. ft. Model HA, the 15 cu. ft. Model HAH, the ½ yd. HE, the ¾ yd. HF, the 1¼ yd. HY or the big 4-wheel drive Model HM.

At Timken Roller Bearing Company,* three men, with hand shovels and wheelbarrows, used to work hard for 20 hours to unload a 50 ton car of heavy lump ferromanganese. Now, one man on the "PAYLOADER" tractor-shovel does the job easily in 5 hours — so that unloading time is reduced 75% and manhours are reduced 91%. This is only one example in hundreds where the "PAYLOADER" has effected amazing savings in time, labor, and costs . . . in loading, unloading, transporting, piling, spreading, and dumping all kinds of bulk materials.

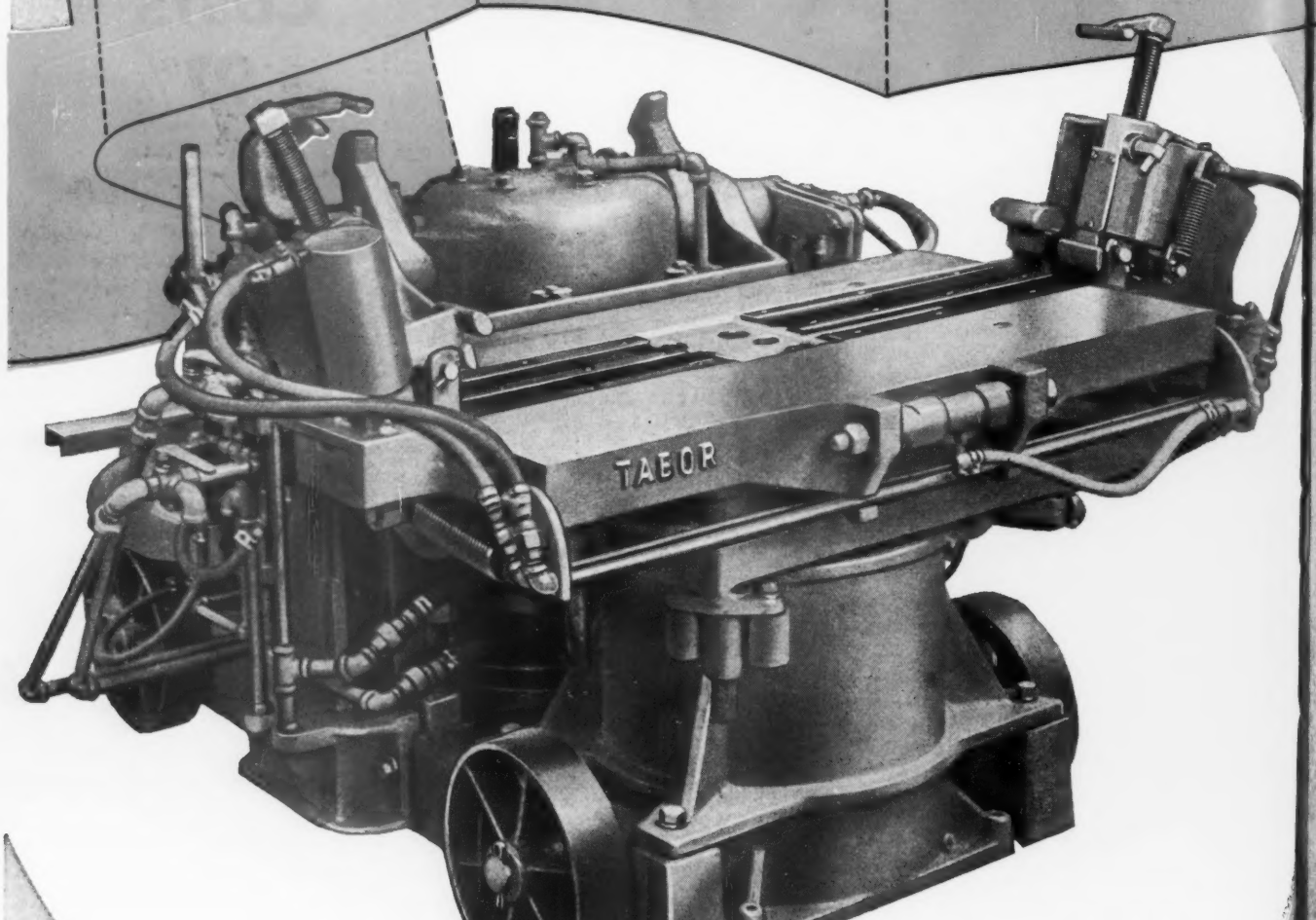
This distinctive tractor-shovel is completely Hough-built *expressly for tractor-shovel work,* with superior features that insure more production and satisfaction — such advantages as several speeds in BOTH directions, and large pneumatic tires that work on ground or floors. If *you* have bulk material handling problems "PAYLOADERS" can probably help you solve them. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. · Since 1920

a ROLLOVER that's Worth



The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

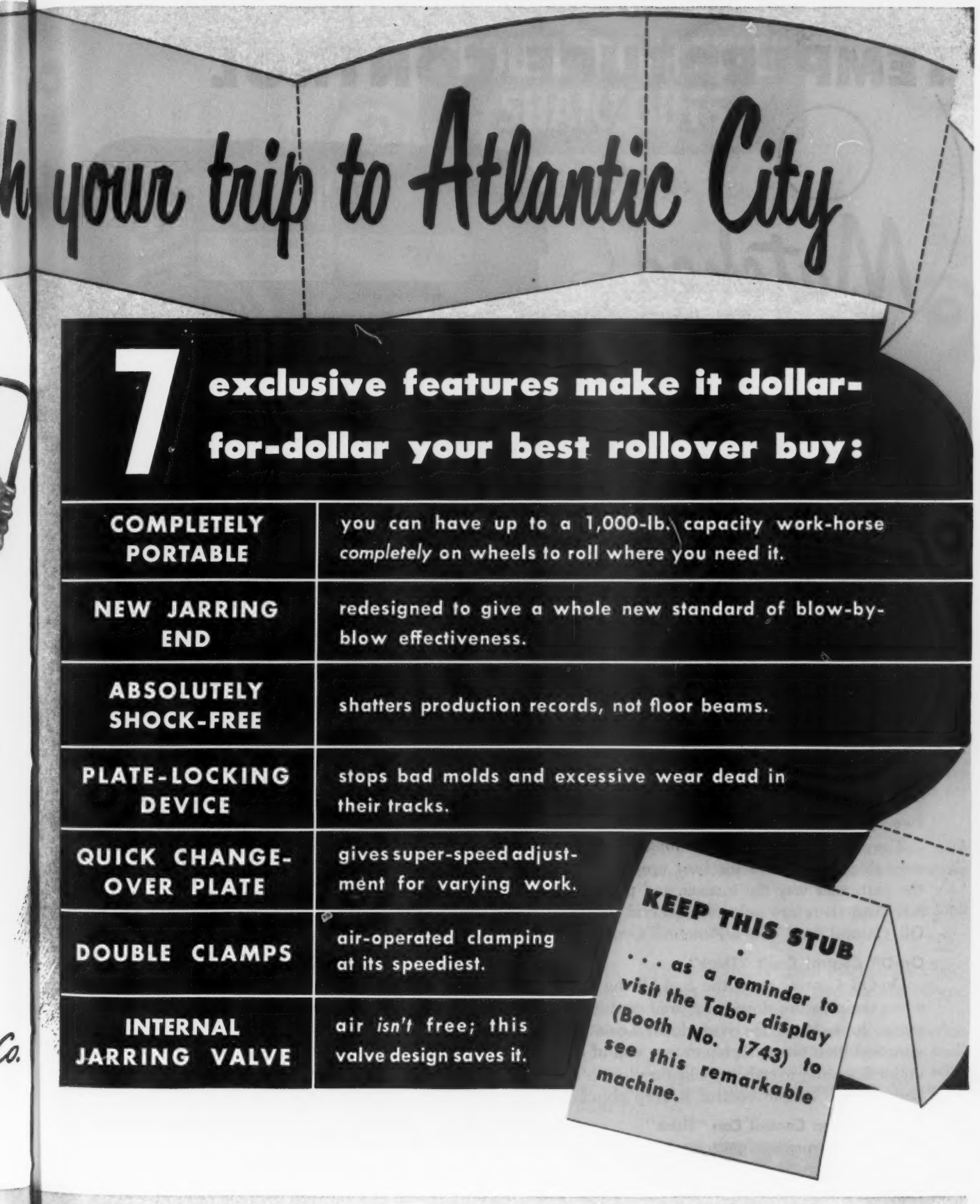
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

Export Department, 765 Drexel Bldg., Phila. 6, Pa.

REPRESENTATIVES

Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

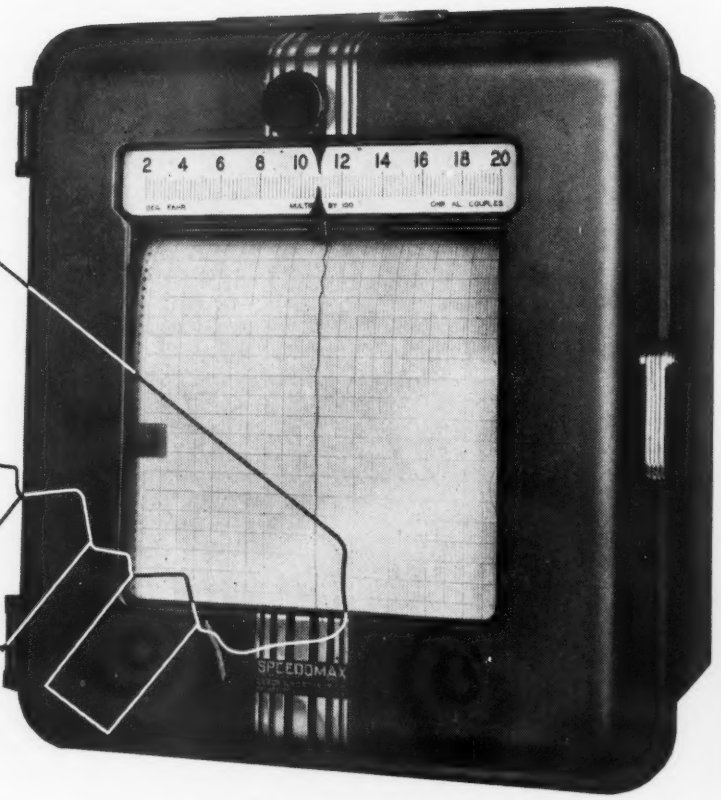
save labor . .


your trip to Atlantic City
7 exclusive features make it dollar-for-dollar your best rollover buy:
COMPLETELY PORTABLE
you can have up to a 1,000-lb. capacity work-horse completely on wheels to roll where you need it.
NEW JARRING END
redesigned to give a whole new standard of blow-by-blow effectiveness.
ABSOLUTELY SHOCK-FREE
shatters production records, not floor beams.
PLATE-LOCKING DEVICE
stops bad molds and excessive wear dead in their tracks.
QUICK CHANGE-OVER PLATE
gives super-speed adjustment for varying work.
DOUBLE CLAMPS
air-operated clamping at its speediest.
INTERNAL JARRING VALVE
air isn't free; this valve design saves it.
KEEP THIS STUB
. . . as a reminder to visit the Tabor display (Booth No. 1743) to see this remarkable machine.
. . . buy Tabor
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.
MEMBER FEMA

TEMPERATURE CONTROL

Matched to your plant's

FURNACE PRODUCT PRODUCTION



Need to get more work out of your furnaces and ovens? The pyrometer that fits the heating equipment, the product and the production need can do a great deal to turn out more tonnage, and also more that meets specifications.

Two Types of Control

The secret of successful automatic control is very simple; just turn the heat up and down in the particular way the furnace and product prefer. And there are only two general ways: On-Off Control, and Three-Function Control.

On-Off Control Can't "Think"

On-Off Control turns the fuel all the way up when temperature drops to a predetermined low point; turns it all the way down again at the specified high point. Temperature will of course undershoot and overshoot; when cycling is inside bounds, this simple control is very popular.

Three-Function Control Can "Think"

Instead of turning fuel up and down at preset limits, three-function control in effect, keeps looking at temperature trends. If they are trying to get out of hand, the Controller heads them off. This "thinking" is done in three ways:

1. Fuel is turned up and down in proportion to the furnace's heat change. (Function one)

2. If the furnace doesn't respond when the fuel is changed, the instrument waits a little—moves the valve again—keeps this up until the furnace does respond. (Function two)

3. If the temperature jumps, as when a heated charge is removed or a fresh charge put into a furnace, the speed of the resulting change can be considered by the Controller. (Function three)

User Tunes the Control

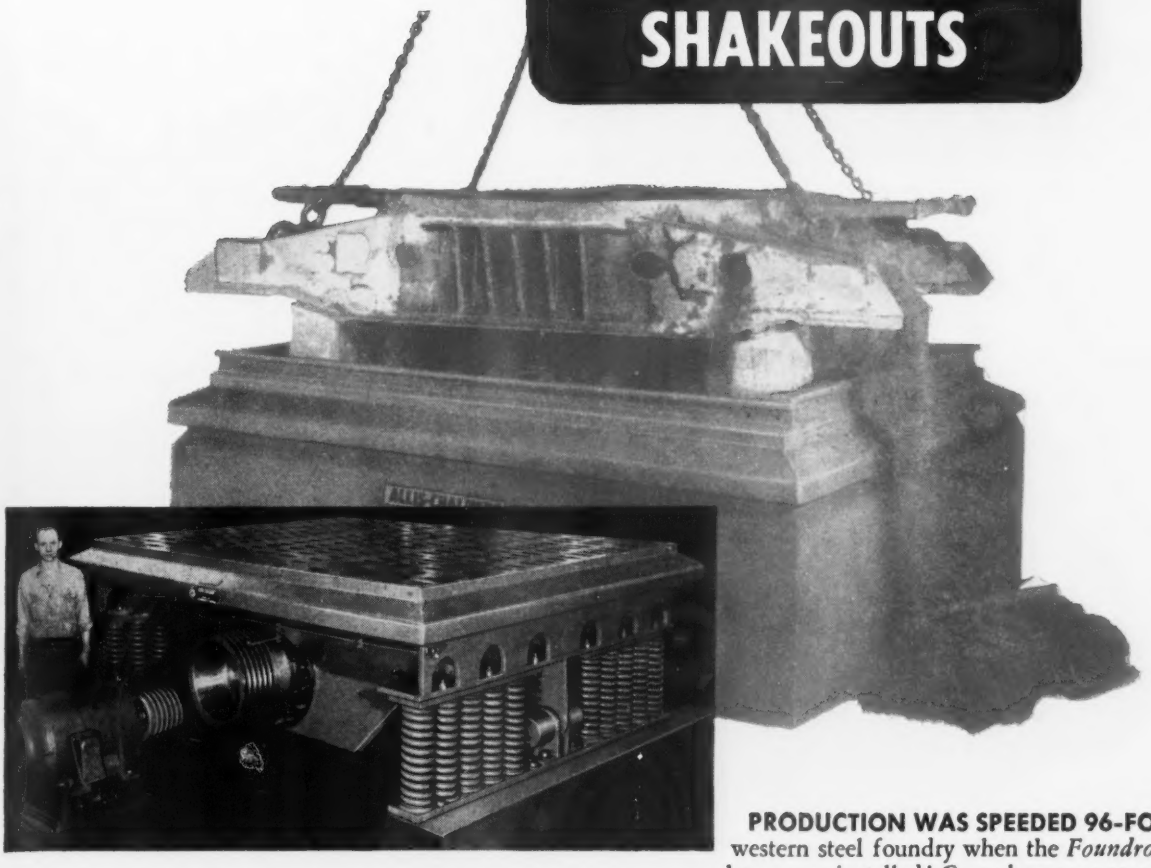
By turning dials on the control pyrometer, the user tunes the three functions to the process: he simply uses his common sense and experience. A big benefit is thus: that every furnace control can be tuned by the best-qualified man in the plant.

Further information on request; contact nearest L&N office or 4917 Stenton Ave., Phila. 44, Pa.

LEEDS NORTHRUP

Jrl. Ad. N-33(52a)

"FOUNDROMATIC" SHAKEOUTS



Heavy body of structural and plate steel is completely stress relieved before machining. Heavy cast steel snubbers keep body centered on durable coil support springs even if side loaded. Pivoted motor base design, coordinated with *Texrope* drive, provides trouble-free operation.

PRODUCTION WAS SPEEDED 96-FOLD at this mid-western steel foundry when the *Foundromatic* shakeout shown was installed! Crane bases are cored out completely in about *five minutes* . . . as compared with an average of *eight hours* required with manual labor.

The *Foundromatic* shakeout, an exclusive and field-proven Allis-Chalmers design, will also radically reduce *your* foundry shakeout and core knockout time. You'll get increased output for these three reasons:

Slash Knockout Time!

1 FASTER SHAKING OUT. Heavy body construction, with decks of 1½ to 2 in. plate steel, gives more "punch" to full load operation.

2 MORE FLOOR SPACE. Shakeout can break up molds as soon as castings are cool, leaving floor area free for re-use.

3 UNINTERRUPTED OPERATION. Rugged two-bearing vibrating mechanism has oversize bearings carrying only eccentric shaft force. And there is no record of shafts or support springs ever breaking.

Get the full story on *Foundromatic* shakeouts, their proven construction features, and how they can benefit *your* foundry operations. Single units built in capacities from one to 25 tons . . . multiple units available to over 100 tons. Call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletins 07B7532 and 07B6365A.

A-3612

ALLIS-CHALMERS

Foundromatic, Texrope and Regulex are Allis-Chalmers trademarks.

Foundry Equipment for Bigger Output—Better Working Conditions!

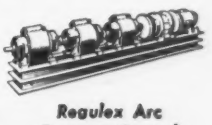
Vibrating Screens

Cupola Blowers

Motors-Drives Control

Foundromatic Core Dryer

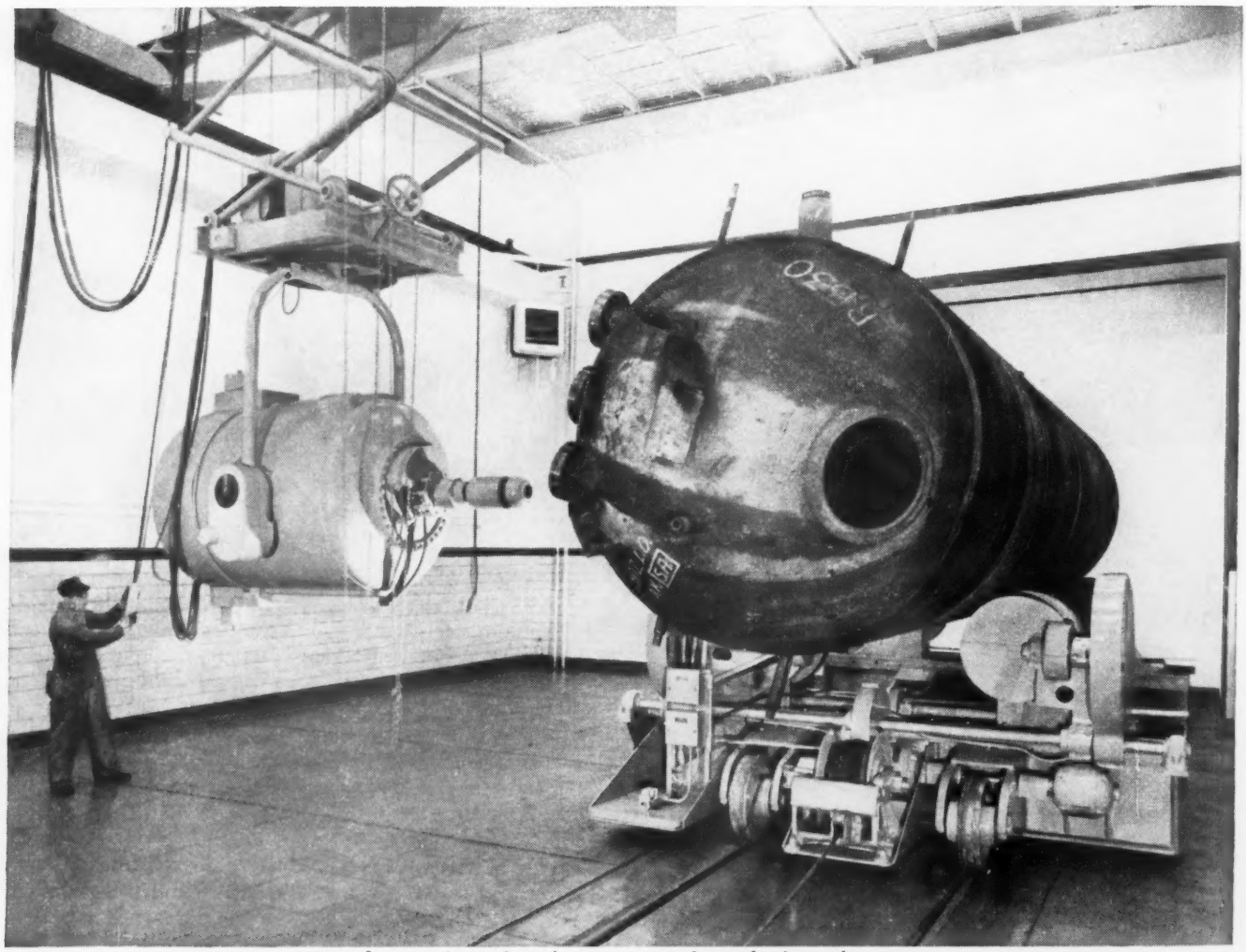
Induction Heating & Melting



Regulex Arc Furnace Control

This x-ray unit cuts time per radiograph

FROM 8 HOURS TO 6 MINUTES



Fast, low-cost inspection of pressure vessels results from the greater penetrating power of the GE Resotron 2000 (2,000,000-volt) x-ray unit.

Only General Electric offers a complete line of apparatus for high-voltage radiography

The success of General Electric high-voltage apparatus is based on more than its ability to cut costs and increase production. It's based on the built-in dependability and long life of each individual piece of equipment. Your assurance of day-in-day-out low-cost operation.

It's also based on a *complete* line of equipment. No matter what your inspection requirements may be, General Electric can give you the *one* unit that does the job *best* . . . at the lowest cost.

And, finally, it's based on the nation-wide General Electric service organization. Each man is factory-trained and equipped to keep your installation at top efficiency.

These are facts. Facts you will want to know before purchasing x-ray equipment for your plant. For full information, write X-Ray Department, General Electric Company, Milwaukee 14, Wisconsin, Dept. YY-5.

You can put your confidence in

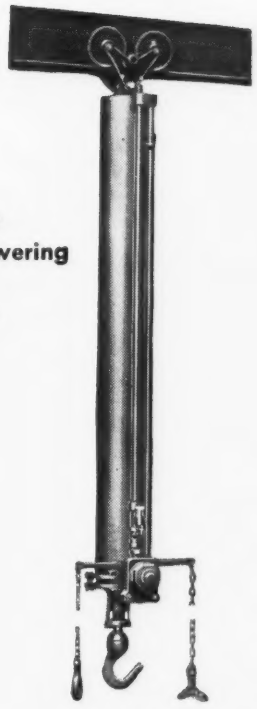
GENERAL ELECTRIC

IT'S IMPORTANT

To SAVE MAN HOURS
REDUCE PRODUCTION COSTS
INCREASE EFFICIENCY

That's Why It Will Pay You to Investigate

CURTIS AIR COMPRESSORS
AIR-OPERATED
CYLINDERS & HOISTS

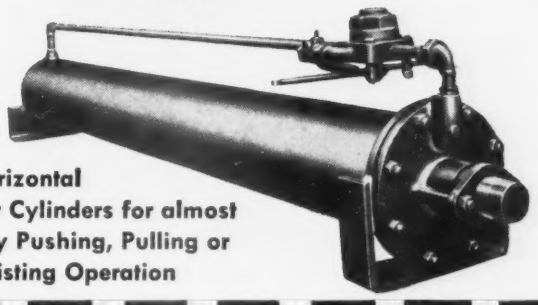


Vertical
Air Hoists
for Low Cost
Lifting or Lowering
of Materials
or Machines

Tank Mounted
Up to 15 H.P.
Inclusive—
Air Cooled

Water-Cooled Compressor,
Up to 50 H.P. Fully Enclosed

- Dust and Dirt Proof
- Carbon Free Valves
- Timken Bearings



Horizontal
Air Cylinders for almost
any Pushing, Pulling or
Hoisting Operation

I-51-1R

Curtis equipment has stood the test of time, because it is precision made from top quality raw materials with 98 years of "know how."

CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 Kienlen Ave., St. Louis 20, Mo.

I am interested in items checked below:

☐ AIR HOISTS
Stroke? ☐ Capacity? ☐

☐ AIR CYLINDERS
Stroke? ☐ Capacity? ☐

☐ AIR COMPRESSORS
Capacity? ☐ Pressure? ☐
Current? ☐

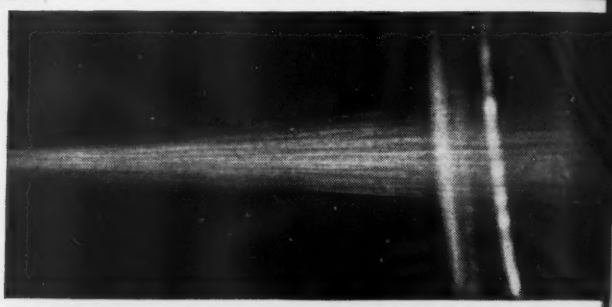
Name.....

Firm.....

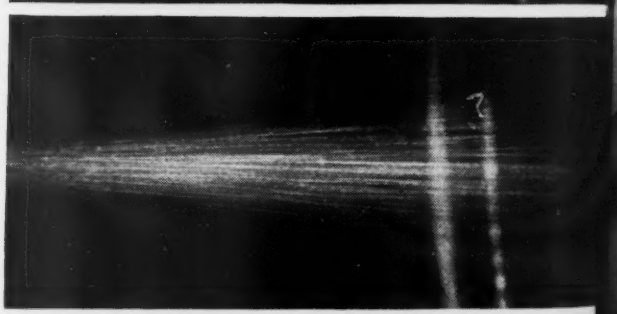
Street.....

City.....Zone.....State.....

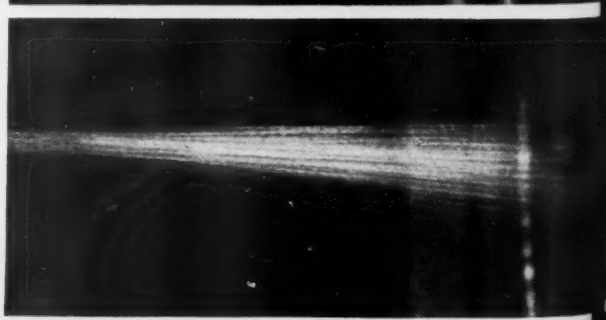
You Can Increase Nozzle Life



High speed photograph of stream from new iron nozzle — note that stream concentration and abrasive velocity and volume are fair.



Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size — stream concentration poor, abrasive velocity and volume low.



Stream from Norbide Nozzle after 404 hours with sand — outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume.

NORTON WEAR-RESISTANT PRODUCTS

Every Time with NORBIDE Nozzles*

IF YOU ARE LOOKING FOR longer nozzle life and more service per dollar cost — then it will pay you to examine the performance of NORBIDE* Nozzles — the most wear-resistant nozzles ever made.

IF YOU WANT to decrease air consumption as much as 20% (over cast iron nozzles) —

IF YOU WANT to improve blast cleaning efficiency by using nozzles that maintain stream contour and abrasive velocity for a long period of service —

IF YOU WANT to do away with costly, time-consuming "down-time" brought about by short nozzle life —

THEN INQUIRE TODAY about long-lived NORBIDE Nozzles, made of Norton Boron Carbide — "the hardest material made by man". **Write for informative bulletin and price list No. 543-F.**

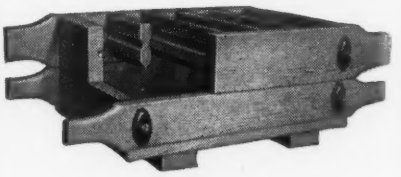
NORTON COMPANY, Worcester 6, Mass.

*Trade-mark Reg. U. S. Pat. Off.

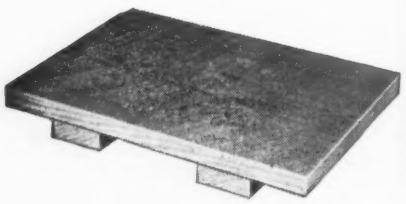
NORTON COMPANY · WORCESTER 6, MASS. NORTON

CMD FOUNDRY SPECIALTIES

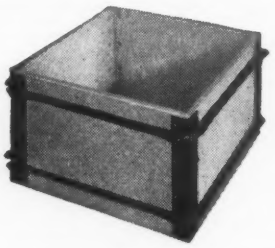
WEDGES
Hard or soft wood



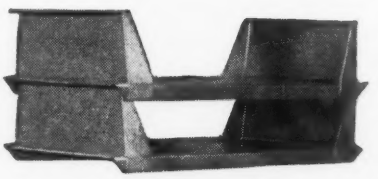
CMD WOOD FLOOR FLASKS
All sizes and shapes



CMD WOOD BOTTOM BOARDS
All sizes and shapes



CMD NON-WARP, NON-BURN SLIP JACKETS



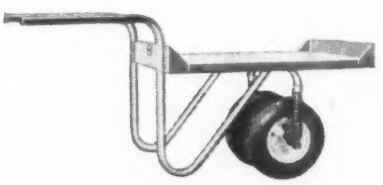
CMD DUAL-PURPOSE CORE TRAYS

CMD TYPE F CHIPPING HAMMER
Metal handle. Head has 2 chisels at right angles

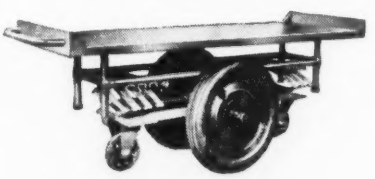
CMD TYPE A CHIPPING HAMMER
Combination drift and chisel

CMD TYPE C CHIPPING HAMMER
For general hand chipping

TEXTITE AIR SEPARATOR
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



CMD PNEUMATIC CORE BARROWS
With single wheel or two wheels. (as shown here)



CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

WRITE FOR BULLETINS
On CMD core-conveying equipment and other foundry specialties—preferred by experienced foundrymen for 25 years.

CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

1928 WEST 46th STREET CHICAGO 9, ILLINOIS

a sad sack or sure saving

WHEN OTHER ABRASIVE STARTS TO CRUMBLE

TRU-STEEL SHOT IS STILL ROUND AND SOLID

It's sad but true. When abrasive starts to crumble, it loses its cleaning efficiency. Through annealing, drawing and other processes, the life of some iron abrasives has been increased so they can be sold as premium abrasives. However, a true steel shot is the only abrasive that NEVER SHATTERS. That's why Tru-Steel Shot lasts longer. It is made of high carbon steel that has received a FULL heat treatment . . . the kind of steel that has proved its stamina in parts like bearings, hammer heads, etc.

Tru-Steel maintains its size and shape longer instead of breaking into the millions of sharp pieces that abrade the wearable parts of your cleaning machine. As a result, you not only have less abrasive to buy, but you also make large savings in replacement parts and maintenance labor. Send for a trial order of Tru-Steel Shot today.

Bulletin 59-A shows where the average cleaning dollar is spent and how savings can be made. Send for your copy today.

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Ind.

TRU-STEEL SHOT

"OH MY ACHIN' BACK"

at $ Per Day Per Back

Cut Non-Productive Time with Ajax Lo-Veyors

One of your *few remaining ways* to pare down your rising costs is to cut your materials handling costs. Today, more than ever before, non-productive time and overhead is of vital concern.

Ajax Lo-Veyors are helping foundrymen speed up sand handling between departments, between machines and between operations.

Ajax Lo-Veyors provide automatic, trouble-free handling, scalping, and separation of sand, sprues, core wires and other foundry materials.

Write for facts on the advantages of Ajax Vibrating Conveyors.

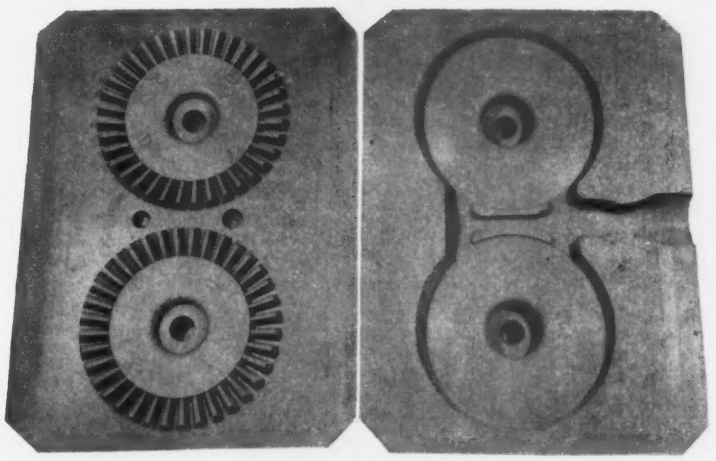
AJAX

LO-VEYORS

SEE AJAX LO-VEYORS IN OPERATION AT THE SHOW IN ATLANTIC CITY BOOTH 1547

AJAX FLEXIBLE COUPLING CO. INC. • WESTFIELD, NEW YORK

If you are investigating the SHELL MOLD process . . .



you will be interested in these results

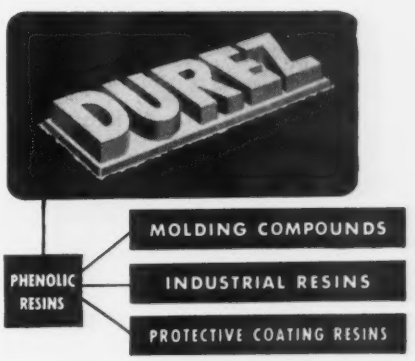
With a background of more than thirty years in developing and manufacturing phenolic materials, Durez has conducted a program of research and experimentation aimed at making the shell mold process of maximum practical value in standard foundry operations. This program has produced outstanding developments, and particularly a new phenolic powdered resin and an efficient wetting agent that are extremely successful in this process. By using these to make the mix you can produce shell molds with advantages which include —

1. High strength at pouring temperatures
2. Minimum curing cycle
3. Perfect reproduction of pattern detail
4. Less dust during mixing

In addition, Durez engineers can help you to —

1. Utilize your present patterns and plates
2. Eliminate surface roughness from castings
3. Remove shell molds of deep draw from patterns without difficulty
4. Eliminate warpage in shell molds

Why not let us help you to profit by the numerous economies of the new process in adapting it to your regular foundry jobs? Your inquiry will receive the prompt attention of our engineering staff.



PHENOLIC RESINS THAT FIT THE JOB

Learn what DUREZ has to offer
INTERNATIONAL FOUNDRY CONGRESS AND SHOW
BOOTH 230 . . . ATLANTIC CITY . . . MAY 1-7
or send us this coupon →

DUREZ PLASTICS & CHEMICALS, INC.
1005 Walck Road, North Tonawanda, N. Y.

Send me information on the shell molding process.

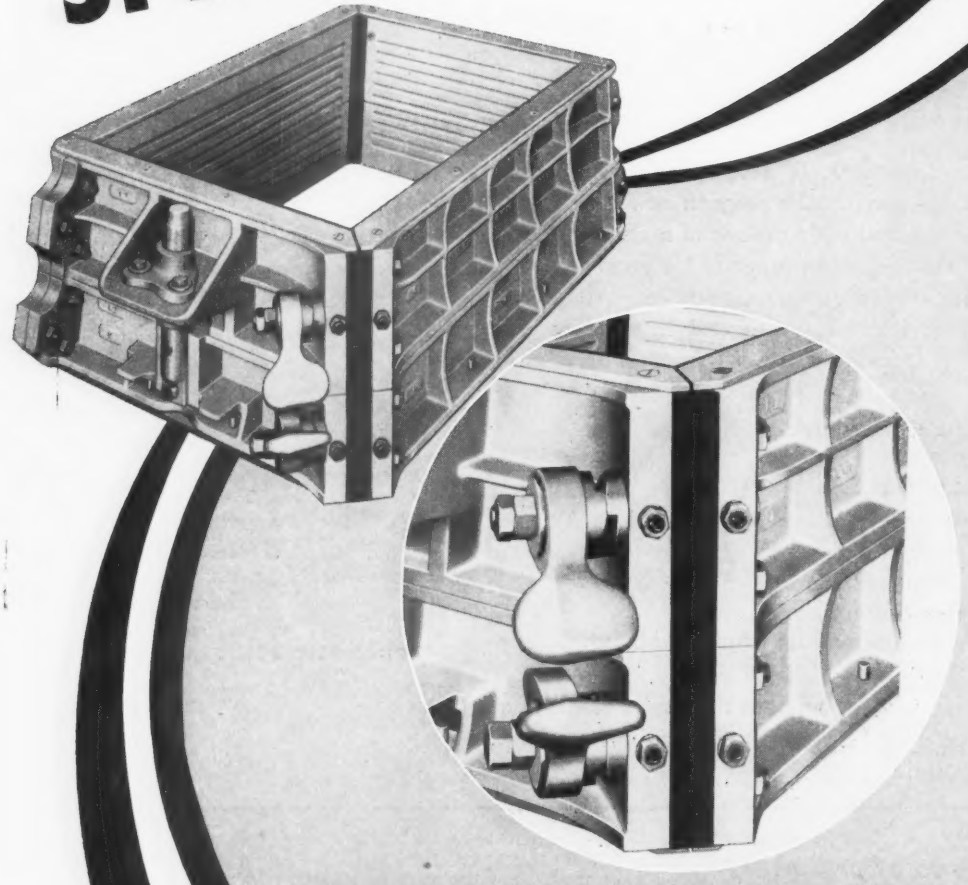
Name_____ Company_____

Address_____ City and State_____

A hit of the Foundry Congress...

Fremont's New

SPREADLOCK FLASK



Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners. No springs to break or lose their resiliency.

This great development in flasks also embodies all the many advantages of Fremont's popular standard magnesium slip flasks, being lighter in weight, thus easier to handle and assuring longer service, more exacting work.

Write today for literature.

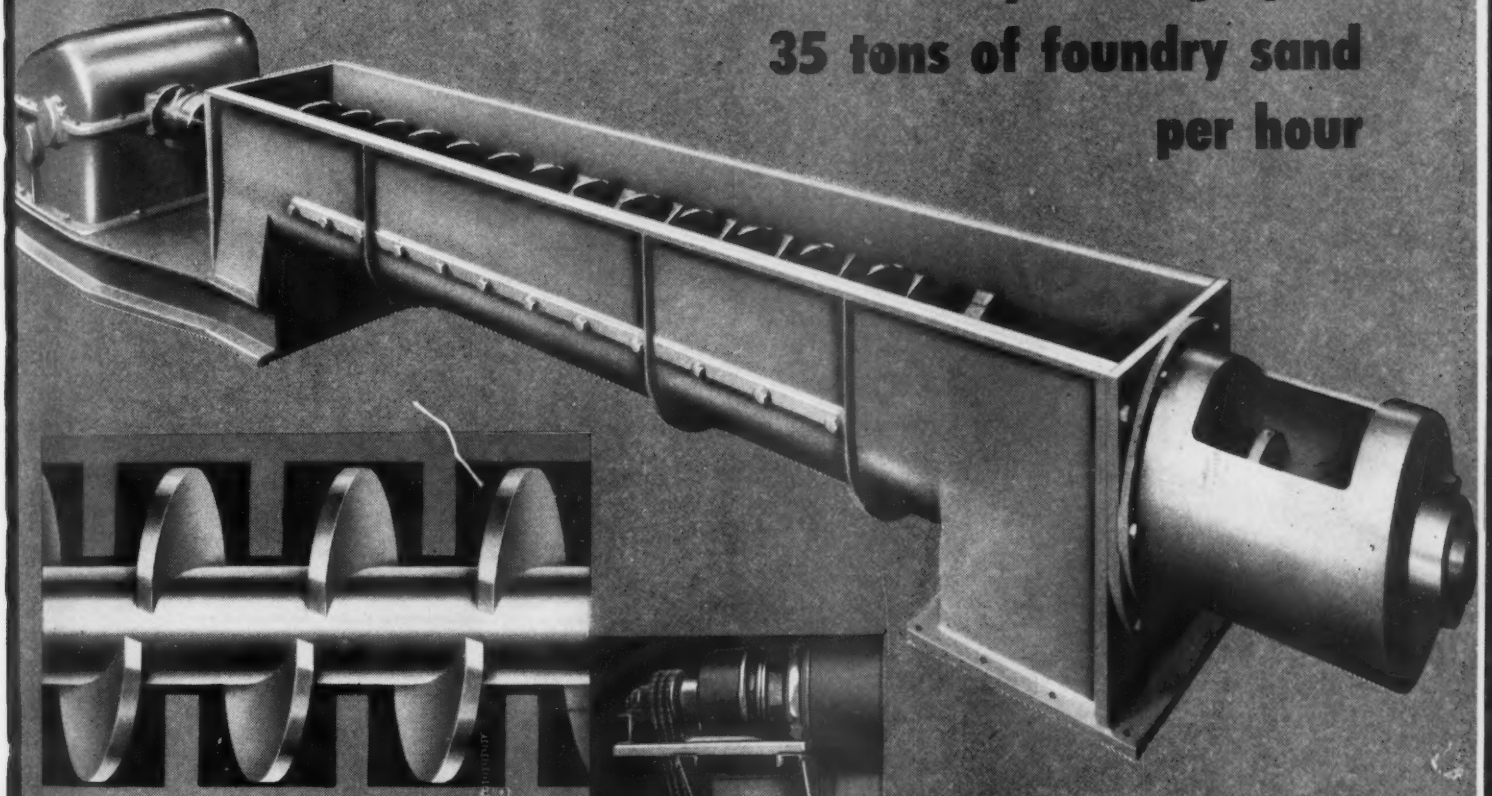
THE FREMONT FLASK COMPANY

FREMONT, OHIO

Baker Perkins Ko-Kneader

(LIST SYSTEM)

an efficient new unit for continuously mixing up to 35 tons of foundry sand per hour



B-P Ko-Kneader in operation handling foundry sand

With revolutionary Baker Perkins Type M List System Ko-Kneaders, continuous mixing of foundry sand becomes a highly practical operation. Essentially, the Ko-Kneader is a mixing worm revolving as well as reciprocating in a trough provided with kneading teeth in such a way that the mixing worm works as a single mixing machine with each tooth. The repetition of this operation, as the sand moves along the trough, completes the mixing and mulling. Baker Perkins Ko-Kneaders save considerable mulling time and also help to improve casting quality because the intense mixing action blends the sand uniformly and thoroughly. Baker Perkins Ko-Kneaders are ruggedly built for long life and dependable service. When used with specially designed Baker Perkins Feeders, operation of the Ko-Kneader is almost entirely automatic, resulting in substantial savings in labor costs. Consult a Baker Perkins sales engineer or write today for complete information.

BAKER PERKINS INC. foundry equipment sales • saginaw, michigan

All the important thoroughbreds of today can be traced back to three famous horses, Matchem, Herod and Eclipse, produced in England from 1748 to 1764. Outstanding blood strains have been developed in this country, too. The three most prominent American male lines, known as the Domino, Ben Brush and Fair Play lines, date back to Civil War times. Descendants of these stallions include such well-known horses as Man o' War, Blue Larkspur, Equipoise, Discovery, Rosemont, Sea Biscuit, Shut Out, Alsab and War Admiral.

Quality

If there is one animal that denotes *quality,* it's the thoroughbred horse. His beautiful, intelligent head and splendid conformation are unmistakable evidence of royal breeding. He is the matchless embodiment of speed, stamina and courage.

Among foundrymen, HINES FLASKS are synonymous with *quality.* The way they're made and the way they perform puts them out in front of all others—stamps them as true thoroughbreds. If you want flasks of matchless *quality*—choose HINES FLASKS, every time. You can be sure they'll give you better service and longer life than any flasks you've ever used.

HINES POP-OFF FLASK

HINES Flasks, Jackets, Upset Frames, Pins and Bushings will be displayed at the International Foundry Congress and Foundry Show, May 1-7, at

BOOTH NO. 1236

HINES FLASKS

THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO • TELEPHONE: ORCHARD 1-2806

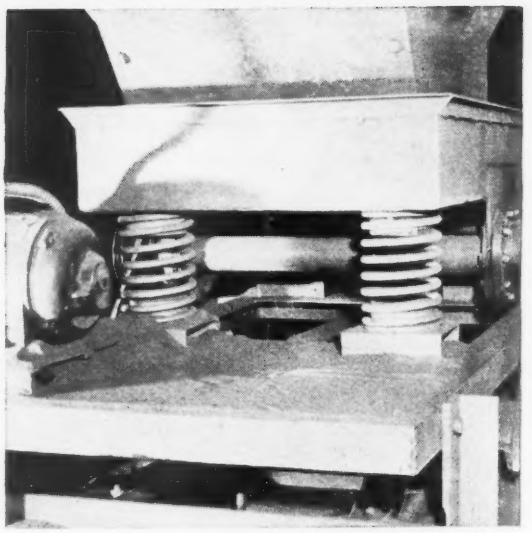
HEWITT-ROBINS

SIMPLIFIES VIBRATING FEEDER PROBLEMS

Hewitt-Robins Vibra-Feeder . . .
First Practical Fully Mechanical
Vibrating Feeder

Simple To Operate: Completely automatic. Just push a button and start feeding—requires no attention or adjustment—can't be overloaded with standard hopper design—won't dampen out—some sizes draw only 2 amps.

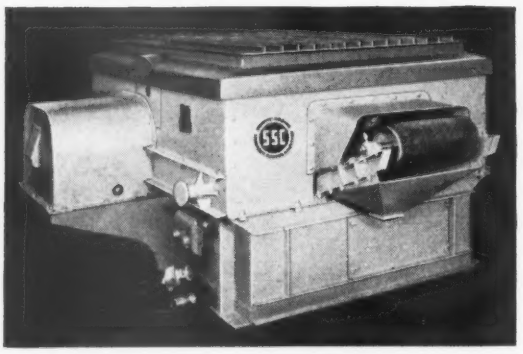
Simple Construction: Vibrating mechanism is fully mechanical—small and compact—completely dust-tight—practically noiseless. Only electricals . . . an AC or DC 1 HP motor and a simple light-duty plug and receptacle.



Full Range Of Sizes: Available from 24" to 48" wide and 48" to 144" long; also other sizes to meet your specifications.

Write for Bulletin 134 for complete information

DESIGNED FOR FOUNDRY SAVINGS



Hewitt-Robins SSC® Unit

5 Foundry Operations with 1 Piece of Equipment

Saves Time: This one compact, self-contained unit takes care of your entire shakeout and sand removal in a single operation.

Saves Space: Requires no more space than the average-size shakeout, yet it serves 5 complete foundry functions . . . flask shakeout—sand screening—lump breaking—conveyor feeding—tramp-metal trapping!

Saves Money: In one jobbing foundry, where it normally took 8 men a total of 7 hours to completely shakeout molds and reclaim sand, the entire foundry floor was cleaned up in just 3 hours by only 3 men and an SSC Unit.

Saves Trouble: Entirely automatic . . . The Hewitt-Robins SSC Unit needs no attention . . . just put the flask on the shakeout deck—turn on the power and the material flows smoothly from sequence to sequence until the Feeder Belt Conveyor discharges the sand.

For complete details about the Hewitt-Robins SSC Unit, write for Bulletin No. 136.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Be Sure To See Our Booth at the Foundry Show

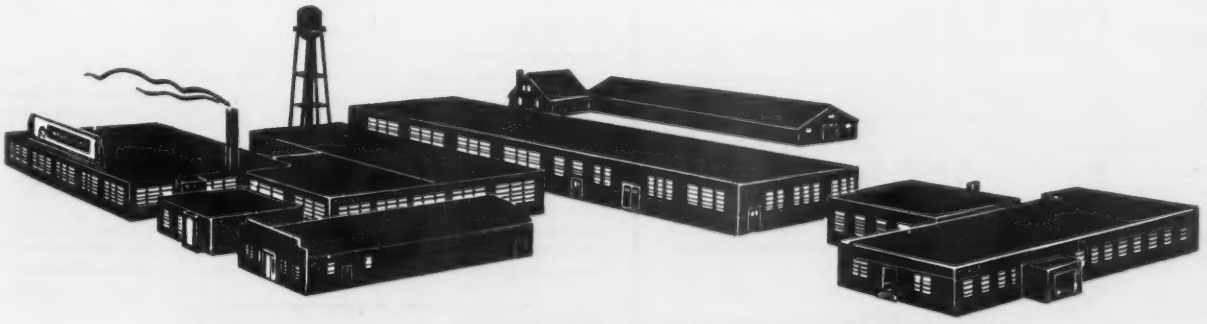
HEWITT-ROBINS INCORPORATED
STAMFORD, CONNECTICUT

Hewitt Rubber Division · Robins Conveyors Division · Robins Engineers Division · Hewitt Restfoam® Division

UNIVERSAL flask pins and bushings are typical of the quality products that have helped to build Universal's Frankenmuth plant

Universal Flask Pins and Bushings are heat-treated and precision ground from finest quality steels. They will save you precious minutes of production time by assuring instant, accurate alignment of cope and drag. Universal Flask Pins and Bushings will give you long, satisfactory service and they will stand up under extremely rough treatment, thus saving you the additional cost and down-time that replacement always requires. Universal Flask Pins and Bushings are typical of the quality products being produced at the big, modern plant of the Universal Engineering Company in Frankenmuth, Michigan.

The modern home of finer production tools



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

158

Advertisement

ELECTROMET Data Sheet

Published by Electro Metallurgical Company, A Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

ALLOYS FOR THE STEEL, IRON, AND NON-FERROUS INDUSTRIES

PRODUCT*	NOMINAL COMPOSITION	USES
BORON ALLOYS		
Ferroboron Min. 10.00% Boron Grade	Silicon.....max. 1.50% Aluminum.....max. 0.50% Carbon.....max. 1.50%	Increases hardenability of steel; also, for additions to malleable iron and aluminum alloys.
Min. 17.50% Boron Grade	Silicon.....max. 1.50% Aluminum....max. 0.50% Carbon.....max. 0.50%	
Manganese-Boron	Boron.....min. 17.50% Manganese...approx. 75% Silicon.....max. 1.50% Carbon.....max. 3% Iron.....max. 5%	Used to cleanse and deoxidize non-ferrous alloys.
Nickel-Boron	Boron.....15 to 18% Silicon.....max. 1.50% Aluminum.....max. 1.00% Carbon.....max. 0.50% Iron.....max. 3.00% Nickel.....Balance	Special boron alloy used principally for deoxidizing nickel and its alloys.
Boron Carbide	Boron.....45 to 50% Carbon .....45 to 50%	Deoxidizer for non-ferrous alloys.
Calcium Boride	Boron.....38 to 42% Calcium.....27 to 32% Carbon.....15 to 20%	Welding rod coating.
SILCAZ Alloy	Boron.....0.55 to 0.75% Silicon.....35 to 40% Calcium.....9 to 11% Aluminum.....6 to 8% Titanium.....9 to 11% Zirconium.....3 to 5%	A complex boron addition agent for increasing the hardenability of steel.
CALCIUM ALLOYS		
Calcium-Silicon	Calcium.....30 to 33% Silicon.....60 to 65% Iron.....1.50 to 3%	Deoxidizer for quality ingot steel. Also used in high-tensile gray irons.
Calcium-Manganese-Silicon	Calcium.....16 to 20% Manganese.....14 to 18% Silicon.....53 to 59%	A complex deoxidizer used widely in production of steel castings.
Calcium Metal		
Regular Grade	Calcium.....98% (Cylinders, Slabs, Cut Pieces, or Turnings)	Reducing agent in metallurgical applications, deoxidizer and degasifier for non-ferrous metals, particularly magnesium.
Distilled Grade	Calcium...approx. 99.90% (Irregular pieces from pea size to 14 in. lumps)	For special applications requiring calcium of very high purity.
CHROMIUM ALLOYS		
Low-Carbon Ferrochrome	Chromium.....67 to 71% Silicon.....0.30 to 1.00% Carbon (10 Grades) max. 0.03 to max. 2.00%	Production of stainless steels and high-temperature alloys requiring low carbon content.
High-Carbon Ferrochrome		
Max. 4.50, 5.00, or 6.00% Carbon Grade	Chromium.....67 to 70% Silicon..... 1 to 2%	For production of engineering alloy steels and other alloy steels of moderate chromium content.
Max. 7.00% Carbon Grade	Chromium.....66 to 69% Silicon..... 1 to 3%	
Min. 7.00% Carbon Grade	Chromium.....65 to 68% Silicon..... 1 to 3%	
Nitrogen-Bearing Low-Carbon Ferrochrome	Chromium.....67 to 71% Silicon.....0.30 to 1.00% Carbon.....max. 0.10% Nitrogen....approx. 0.75%	For additions of nitrogen to improve properties of high-chromium steels.
"SM" Ferrochrome	Chromium.....60 to 65% Silicon ..... 4 to 6% Carbon..... 4 to 6% Manganese..... 4 to 6%	A high-solubility chromium addition for steel or iron in either furnace or ladle.

PRODUCT*	NOMINAL COMPOSITION	USES
CHROMIUM ALLOYS cont.		
Foundry Ferrochrome High-Carbon Grade	Chromium.....62 to 66% Silicon..... 7 to 10% Carbon..... 5 to 7%	Developed especially for high-solubility ladle additions of chromium to improve composition and properties of cast iron.
Low-Carbon Grade	Chromium.....50 to 54% Silicon.....28 to 32% Carbon.....max. 1.25%	
Chromium Metal Low-Carbon Grades	Chromium.....min. 97% Carbon .....max. 0.10% and 0.50% Iron.....max. 1%	Production of wide variety of non-ferrous chromium-bearing alloys, including electrical resistance alloys and high-temperature alloys.
High-Carbon Grade	Chromium.....87 to 90% Carbon..... 9 to 11% Iron.....max. 1.25%	
"EM" Ferrochrome-Silicon No. 1 Grade	Chromium.....39 to 41% Silicon.....42 to 46% Carbon.....max. 0.05%	In production of stainless steels, these alloys are used to reduce metal oxides from the slag back into bath.
No. 2 Grade	Chromium.....36 to 39% Silicon.....36 to 39% Carbon.....max. 0.05% Aluminum..... 7 to 9%	
"EM" Ferrosilicon-Chrome	Chromium.....50 to 54% Silicon.....28 to 32% Carbon.....max. 1.25%	For adding chromium and silicon to steels containing up to 1 or 2 per cent chromium.
"EM" Chromium Briquets (Hexagonal Shape)	Chromium.....2 lb. Total Weight.....3⅛ lb.	For adding chromium to cast iron in the cupola.
COLUMBIUM ALLOYS		
Ferrocolumbium	Columbium.....50 to 60% Silicon.....max. 8% Carbon.....max. 0.40%	Stabilizer in austenitic chromium-nickel stainless steels. Also constituent of high-temperature alloys.
Ferrotantalum-Columbium	Columbium...approx. 40% Tantalum.....approx. 20% Cb+Ta .....min. 60% Silicon.....4 to 6% Carbon.....max. 0.30%	Another stabilizer, used to supplement ferrocolumbium, in austenitic chromium-nickel stainless steels. Also used in high-temperature alloys.
MANGANESE ALLOYS		
Standard Ferromanganese Regular Grade	Manganese.....78 to 82% Carbon.....approx. 7% Silicon.....max. 1%	Most common means of adding manganese to steel for both alloying and deoxidizing purposes. Also for counteracting sulphur in steel and cast iron.
Low-Phosphorus Grade	Manganese.....78 to 82% Carbon.....max. 7% Silicon.....max. 2% Phosphorus...max. 0.10%	
Low-Carbon Ferromanganese Low-Phosphorus Grade	Manganese.....min. 90% Carbon.....max. 0.07% Phosphorus...max. 0.06%	Additions of manganese to steels of low-carbon specification, particularly stainless steels of 18 per cent chromium, 8 per cent nickel type.
Regular Grades	Manganese.....85 to 90% Carbon ....max. 0.07, 0.11 to 0.15, 0.30, or 0.50%	
Regular Grade (High-Silicon)	Manganese.....80 to 85% Carbon.....max. 0.75% Silicon..... 5 to 7%	
Medium-Carbon Ferromanganese	Manganese.....80 to 85% Carbon.....max. 1.25 to 1.50%	For making low- and medium-carbon manganese steel and Hadfield steel.
Silicomanganese		
Max. 1.50% Carbon Grade	Manganese.....65 to 68% Silicon.....18 to 20%	A versatile alloy useful as furnace block, deoxidizer, and also for making manganese additions to steel in the ladle or in the furnace.
Max. 2.00% Carbon Grade	Manganese.....65 to 68% Silicon.....15 to 17.50%	
Max. 3.00% Carbon Grade	Manganese.....65 to 68% Silicon.....12 to 14.50%	

*All of the alloys and metals listed are produced in the usual lump, crushed, or ground sizes, except where other special forms are indicated.

PRODUCT*	NOMINAL COMPOSITION	USES
MANGANESE ALLOYS cont.		
Low-Iron Ferromanganese	Manganese.....85 to 90% Carbon.....approx. 7.00% Silicon.....max. 3% Iron.....max. 2%	For high manganese additions to certain non-ferrous alloys, particularly aluminum.
Manganese Metal	Manganese.....min. 96% Carbon.....max. 0.20% Silicon.....max. 1.00% Iron.....max. 2.50%	Used both as deoxidizer and alloy in production of numerous non-ferrous metals and alloys.
"EM" Silico-manganese Briquets (Square Shape)	Manganese.....2 lb. Silicon.....½ lb. Total Weight.....3½ lb.	For adding manganese (with silicon) to cast iron in the cupola.
"EM" Ferro-manganese Briquets (Oblong Shape)	Manganese.....2 lb. Total Weight.....3 lb.	For adding manganese (without silicon) to cast iron in the cupola.
SILICON ALLOYS		
50% Ferrosilicon		
Regular Grade	Silicon.....47 to 51%	Deoxidizer for most grades of killed or semi-killed steel. Blocking grade specially sized for maximum efficiency.
Blocking Grade	Silicon.....47 to 51%	
Low-Aluminum Grade	Silicon.....47 to 51% Aluminum.....max. 0.40%	
65% Ferrosilicon		
Low-Aluminum Grade	Silicon....61.50 to 66.50% Aluminum.....max. 0.50%	Mainly for production of electrical sheet steel.
75% Ferrosilicon		
Regular Grade	Silicon.....73 to 78%	Deoxidizer and alloy for production of high-silicon spring and electrical sheet steel. Graphitizing inoculant for cast iron.
Low-Aluminum Grade	Silicon.....73 to 78% Aluminum.....max. 0.50%	
85% Ferrosilicon		
Regular Grade	Silicon.....83 to 88%	Enables melter to add higher percentages of silicon without chilling metal in ladle. Graphitizing inoculant for cast iron.
Low-Aluminum Grade	Silicon.....83 to 88% Aluminum.....max. 0.50%	
90% Ferrosilicon		
Regular Grade	Silicon.....92 to 95%	Permits large additions of silicon without harmful chilling effect.
Low-Aluminum Grade	Silicon.....92 to 95% Aluminum.....max. 0.50%	
Silicon Metal		
Regular Grade	Silicon.....min. 97 or 96% Iron.....max. 1 or 2%	Additions of silicon to non-ferrous metals, particularly aluminum and copper, to improve physical properties.
Purified Grade	Silicon....99.70 to 99.90% Iron.....005 to .015%	For applications in non-ferrous industry requiring silicon of high purity.
Low-Calcium Grade	Silicon.....min. 97% Iron.....max. 1% Calcium.....max. 0.10%	For the production of high-silicon aluminum alloys where calcium is detrimental.
Low-Aluminum Grade	Silicon.....min. 98% Iron.....max. 1% Aluminum.....max. 0.10%	For the production of silicon-copper alloys where aluminum is detrimental.
"SMZ" Alloy	Silicon.....60 to 65% Manganese..... 5 to 7% Zirconium..... 5 to 7%	Particularly strong graphitizing inoculant used in making ladle additions to cast iron.
Special Graphitizer	Ferrosilicon Compound	Acts as both deoxidizer and graphitizer in cast iron. Useful in controlling chilling tendencies.
Magnesium-Ferrosilicon	Silicon.....approx. 46% Magnesium..approx. 8.5%	For ladle addition to cast iron to obtain special properties.
Barium-Silicon	Barium.....40 to 50% Silicon.....45 to 55%	For deoxidation of non-ferrous alloys.
"EM" Silicon Briquets (Cylindrical Shape)		
Large Size	Silicon.....2 lb. Total Weight.....5 lb.	For adding silicon to cast iron in the cupola.
Small Size	Silicon.....1 lb. Total Weight.....2½ lb.	

"Electromet," "EM," "Silcaz," "SM," and "SMZ," are trade-marks of Union Carbide and Carbon Corporation.

PRODUCT*	NOMINAL COMPOSITION	USES
TITANIUM ALLOYS		
Ferrotitanium	Titanium.....27 to 32% Carbon.....max. 0.10%	For adding titanium to stabilized austenitic chromium-nickel stainless steels and to high-temperature metals.
Silicon-Titanium	Titanium.....40 to 50% Silicon.....45 to 50% Iron.....max. 3%	For additions of titanium to steels or non-ferrous alloys.
Manganese-Nickel-Titanium	Titanium.....43 to 48% Nickel.....approx. 25% Manganese.....max. 8% Aluminum.....max. 18% Iron.....max. 5%	Deoxidization of nickel alloys.
TUNGSTEN ALLOYS		
Ferrotungsten	Conforming to A.S.T.M. Spec. A 144-39	For production of tool and die steels; also high-temperature alloys.
Tungsten Metal Powder		Production of tungsten steels and cast tungsten carbide.
Melting Grade	Tungsten.....min. 98.80% Total Carbon..max. 0.25%	
Calcium Tungstate Nuggets	Tungstic Oxide..68 to 72%	For production of tool steels and high-temperature alloys by direct reduction.
VANADIUM ALLOYS		
Ferrovanadium	Vanadium.....50 to 55% Carbon....max. 0.20, 0.50, or 3.00% Silicon....max. 1.50, 2.00, or 8%	Production of tool and engineering steels, high-strength structural steels, non-aging rimming steels, and wear-resistant irons.
Vanadium Oxide Fused	V_2O_5.....86 to 89% Na_2O.....approx. 10% CaO.....approx. 2%	For addition of vanadium to steel and for manufacturing catalysts.
Sodium Polyvanadate (Red Cake)	V_2O_5.....approx. 85% Na_2O.....approx. 9% CaO.....approx. 2% H_2O.....approx. 2.5%	For manufacture of vanadium compounds, including vanadium catalysts.
High-Purity	V_2O_5.....approx. 99.50%	
Ammonium Metavanadate	NH_4VO_3.....min. 99%	
ZIRCONIUM ALLOYS		
12 to 15% Zirconium Alloy	Zirconium.....12 to 15% Silicon.....39 to 43% Carbon.....max. 0.20%	This zirconium alloy is a powerful deoxidizer. It also increases depth of hardening.
35 to 40% Zirconium Alloy	Zirconium.....35 to 40% Silicon.....47 to 52% Carbon.....max. 0.50%	Deoxidizer for fine grades of alloy steels. Used for adding larger amounts of zirconium.
Nickel-Zirconium	Zirconium.....25 to 30% Nickel.....40 to 50% Aluminum....approx. 15% Silicon.....max. 10% Iron.....max. 5%	Effective for deoxidizing and degasifying nickel and its alloys.

IF YOU HAVE A METALS PROBLEM

More than 50 different alloys and metals are produced by ELECTROMET in hundreds of varying compositions and sizes. If you need help in selecting the proper alloys, or have some specific metallurgical problem, be sure to consult one of ELECTROMET'S specially trained metallurgists and engineers. Address your inquiries to one of the offices listed below.

Birmingham 3, Ala.....Brown-Marx Building
Chicago 1, Ill.....230 N. Michigan Avenue
Cleveland 14, Ohio.....Union Commerce Building
Detroit 2, Mich.....6-240 General Motors Building
Los Angeles 58, Calif.....2770 Leonis Boulevard
New York 17, N. Y.....30 East 42nd Street
Pittsburgh 22, Pa.....2207 Oliver Building
San Francisco 6, Calif.....22 Battery Street
In Canada: Electro Metallurgical Company of Canada Limited, Welland, Ontario

we Hug That Work

to cut your portable grinding costs!

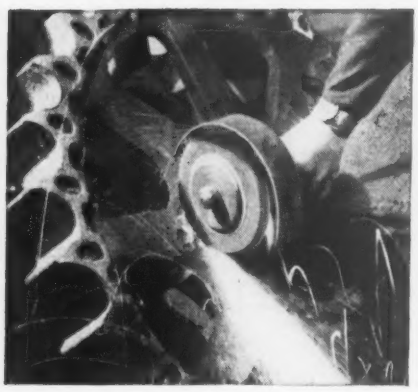
FASTER GRINDING, LONGER WHEEL LIFE AND LESS OPERATOR FATIGUE add up to big savings when Norton wheels take over your portable grinding jobs. *They hug that work!*

Yes, Norton portable grinding wheels have *controlled uniformity* and *built-in balance*, the like of which you've never seen before. This gives them a unique ability to stay in more continuous contact with the work. This *plus* comes from the "new process" of manufacture recently developed by Norton technicians . . . an outstanding step in the continuing Norton program to cut all your grinding costs.

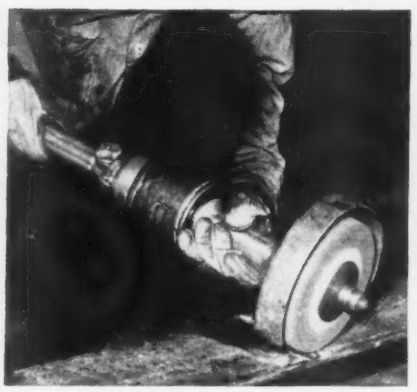
Ask your nearby Norton distributor to give you all the facts about new, improved Norton portable grinding wheels. He's listed under "Grinding Wheels" in your classified telephone directory. Or write direct to Norton Company, Worcester 6, Mass. Distributors in all principal cities.

EXPORT: Norton Behr-Manning Overseas Inc., Worcester, Mass., New Rochelle, N. Y.

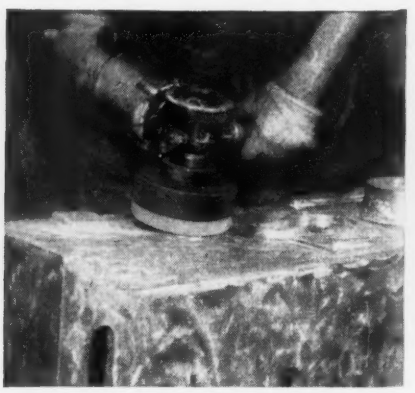
NORTON PORTABLE GRINDING WHEELS HUG THAT



SNAGGING GIANT DRIVE WHEELS is just one of many jobs done by Norton straight wheels at lower labor and wheel costs. *They hug that work.* So, they don't waste time or wheels . . . nor tire the operator.



HEAVY DUTY WELD GRINDING is another job for which Norton straight wheels are the popular choice. Their controlled uniformity and built-in balance keep them cutting faster, easier and longer.



SURFACING A MACHINE TOOL BASE is easy work for a Norton cup wheel and its operator. The wheel's fast, smooth cutting action means low grinding cost and minimum operator fatigue.

GRINDING WHEEL INSTITUTE MEMBER

Making better products to make other products better

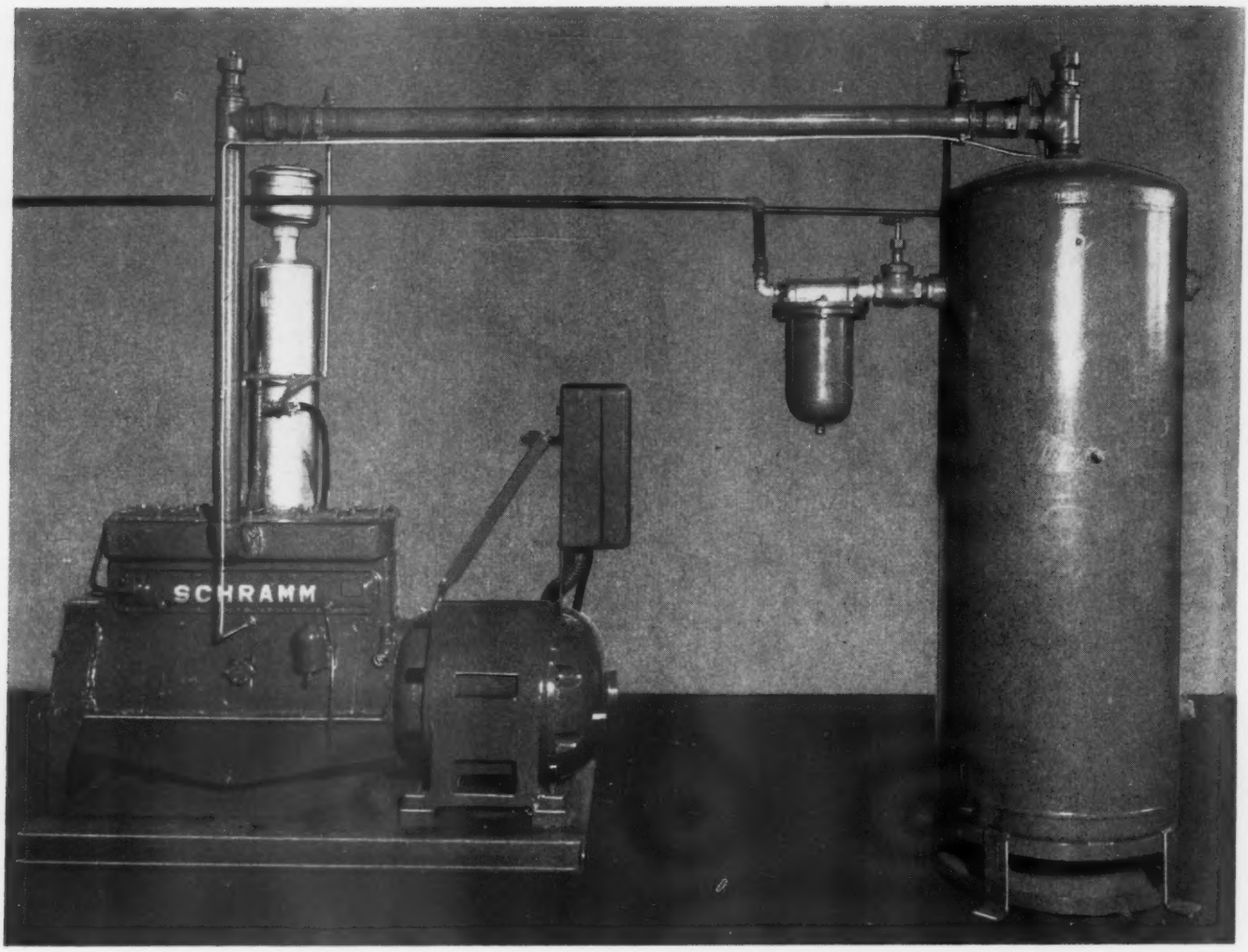
WORK AND CUT YOUR COSTS ON JOBS LIKE THESE:

SMOOTHING UP THIS BED CASTING OF A PRINTING PRESS is a typical example of the cost-cutting performance of Norton cone wheels. They're built to take it . . . thanks to the special Norton resinoid bond.

CLEANING BETWEEN THE FINS OF THIS COMPRESSOR CASTING is an easy job with a Norton REINFORCED Hub Wheel of the rigid type — the BD. It's fast cutting, and its layers of fabric reinforcement assure maximum safety.

BLENDING IN A WELD can be done speedily with the new flexible Norton REINFORCED Hub Wheel. It's known as the Type BFR and is not only fast cutting but safe to use because of its fabric reinforcement.

NORTON
ABRASIVES



Schramm supplies the AIR

As usual, SCHRAMM Inc. will supply the air for the exhibitors at the FOUNDRY SHOW this month at Atlantic City. The installation we expect to use will be similar to the outfit illustrated above. This typical, complete installation of a SCHRAMM AIR COMPRESSOR with Schramm accessories, represents the ultimate in efficiency and performance. It represents many improvements and departures from the earliest SCHRAMM installations, when this company first supplied air for exhibitors at a Foundry Convention. Over the years our products have been honored by consumers, but one of our greatest honors has been the fact that exhibitors have taken for granted the line "AIR SUPPLIED BY SCHRAMM". In the eyes of the foundry industry, SCHRAMM means dependable air. Our compressors range in size from ½ to 100 horse power with correct type of drive and mounting to fill every industrial requirement. See them at the Show. We're glad of this opportunity for old friends to get together, and we'll be looking for you.

We'll be looking forward to the Foundry Show and to seeing all our friends. Drop in, visit and chat. Our Booth No. is:

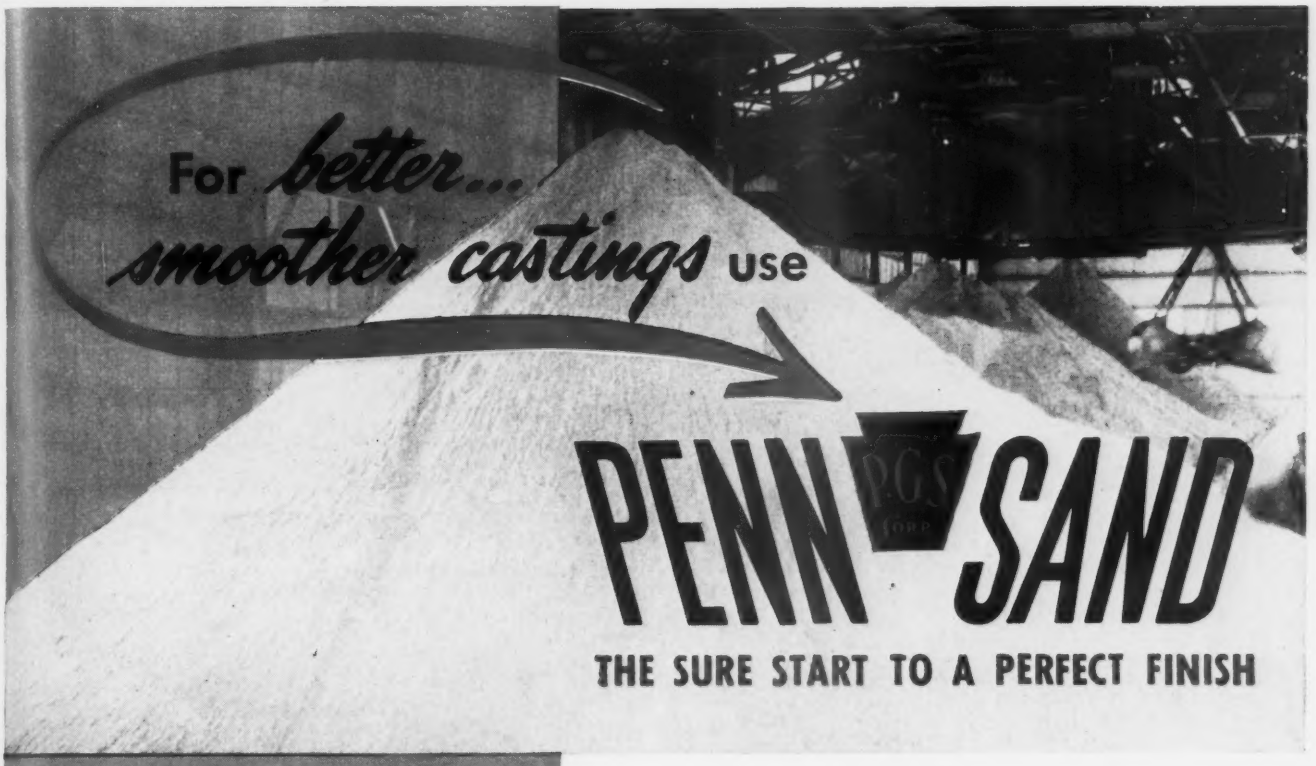
1 2 5 5

and

1 2 5 7

SCHRAMM *Inc.*

MANUFACTURERS OF PORTABLE AND STATIONARY AIR COMPRESSORS, WEST CHESTER, PA.



- MOLDING SAND
- CORE SAND
- SHELL-MOLDING SAND
- SAND BLAST SAND
- SILICA FLOUR

WASHED, DRIED and SCREENED GRADES For

- Steel
- Gray Iron
- Malleable
- Brass
- Bronze
- Aluminum

and Magnesium Castings

VISIT OUR EXHIBIT IN BOOTH 234

AT THE INTERNATIONAL FOUNDRY SHOW

ATLANTIC CITY, MAY 1-7

Find out how you can get better finish and higher permeability with the same sand—PENN-O-SAND. Unique grain structure and distribution give PENN-O-SAND built-in lower density, which in turn results in both lower confined expansion and higher permeability. These inherent advantages save you time and money by reducing rat tails, veining, scabbing, buckles and other defects.

PENNSYLVANIA GLASS SAND CORP.

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Eastern Sales Offices, TRENTON TRUST BUILDING, TRENTON, NEW JERSEY

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NOW! SAND TRANSPORTING COSTS LESS

...WITH

CRANE TURBO-DRIVE

THE PNEUMATIC PIPELINE CONVEYOR SYSTEM

SEE CRANE *TURBO-DRIVE* IN OPERATION AT THE FOUNDRY SHOW
(BOOTH 1134)

Cost studies made on installation after installation prove that the Crane *Turbo-Drive* reduces to a minimum the cost of transporting sand in batches.

It's economical to install and operate because the pipe and switches can be run anywhere. Vertical or horizontal runs, angle turns—walls and other obstacles are no problem. If you are modernizing your present foundry or building a new one, it will pay you to check into this modern, economical sand conveyor. For further information and engineering service, write to Crane Co. at the address below or see us at the Foundry Show.

INEXPENSIVE—initial installation cost is low, and operating cost is more economical than other methods.

LOW MAINTENANCE—simplicity of design and dependable construction reduce maintenance to a minimum.

SAVES MAN-HOURS—entire system is controlled by a single operator.

SPEEDS DELIVERY—transports material to desired location in a few seconds.

SAVES SPACE—installation requires minimum floor space.

BATCH DELIVERY—each batch delivered complete.

CLEAN—NO DUST—material fully enclosed and protected at all times. Mixed materials are not affected in transit.

SAFE—all working parts are pressure designed. Material moves safely in steel pipe.

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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Better All The Way

WITH NVX IN THE GREEN SAND FACING

These unretouched pictures (Courtesy Farrell-Cheek Steel Company, Sandusky, Ohio) tell a big story of what a little Hercules NVX in your green sand facing can do to give you better molds and better castings.

NVX improves sand flowability and workability—means more firmly rammed molds. Even in this deep-pocketed pattern, there were no peening or ramming problems.

NVX gives good draw. It also keeps the sand from drying out—means a better first finish, less time spent in final finishing. Note the smooth surfaces on this massive steel casting, shown as it came from the mold.

These results are typical of those you can get on castings of any size or shape. And remember that your green sand facing will need no more than one-half of one per cent by weight of Hercules NVX.

Send for technical data. 100-lb. lots of NVX for testing are available from Hercules at the 1000-lb. price.

HERCULES POWDER COMPANY
INCORPORATED
Naval Stores Dept., 920 King St., Wilmington 99, Del.

NF52-2

FROM PATTERN...

TO MOLD...

TO CASTING...

SAVE TIME AND MONEY WITH *HERCULES*® NVX

SMALL FOUNDRIES agree:

"It's good business to install a cost-saving WHEELABRATOR®"

Are you putting off modernizing your cleaning room because you believe your tonnage is too small to justify a Wheelabrator? Many foundry owners, who once shared this belief, now say they couldn't afford to operate without their Wheelabrator. They have discovered that, "It's good business to install a cost-saving Wheelabrator."

Here's how the WHEELABRATOR will save for you—

Saves Time—Speeds Production. Wheelabrator speed cleaning saves many costly man hours in cleaning time, releasing manpower for other work. It handles a greater quantity of castings and cleans them better in much less time.

Provides Competitive Advantages. A Wheelabrated finish—all sand and scale are removed right down to the virgin metal—is an important sales factor. More and more firms are demanding this surface cleanliness.

Creates New Sales Opportunities. Wheelabrator's fast, thorough cleaning puts your services on a par with competitors. Castings are delivered faster to your customers.

Profitable Job Cleaning Possible. Many foundries utilize their Wheelabrator part time for job cleaning providing a new source of business and real extra profits.

Returns Investment Quickly. Savings effected are usually sufficient to amortize investment in from six to eighteen months.

Other Important Advantages. Valuable space made available, decreased casting rejects, improved foundry efficiency, and better working conditions.

FOR BEST RESULTS—

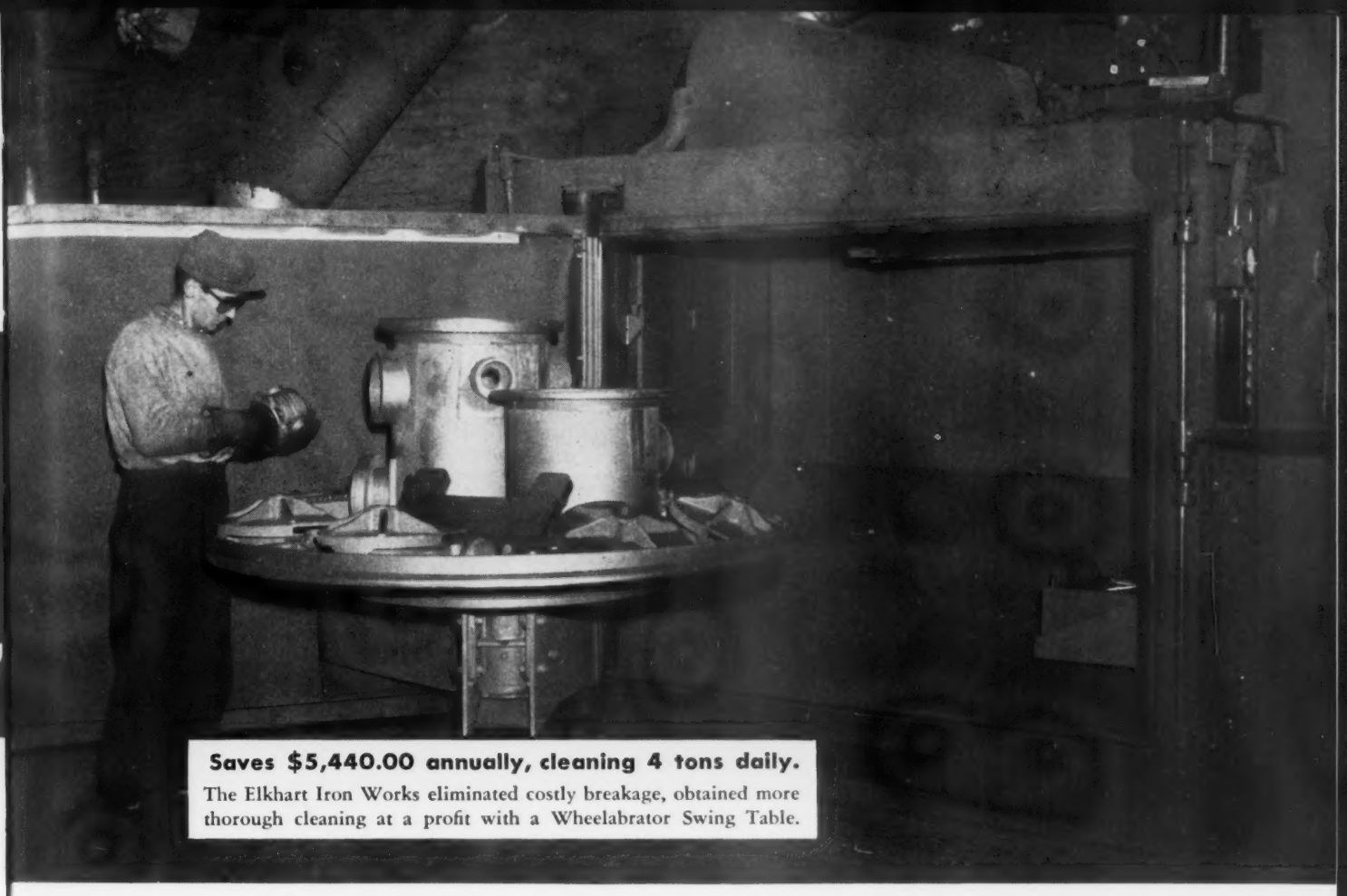
always use Tru-Steel Shot in your blast cleaning equipment. The only perfected Tru-Steel Shot, it holds its shape longer to reduce cleaning costs. Send today for descriptive booklet No. 59-A.

SEND for this literature—

Catalog 74-A describes the Wheelabrator method and shows what it is doing for others.

Bulletin No. 26. Wheelabrator's liberal deferred payment plan lets you reap the benefits of the equipment immediately at the lowest possible initial cost without dissipating your working capital.

WORLD'S LARGEST BUILDER OF AIRLESS BLAST



Saves $5,440.00 annually, cleaning 4 tons daily.
The Elkhart Iron Works eliminated costly breakage, obtained more thorough cleaning at a profit with a Wheelabrator Swing Table.

Here's how the WHEELABRATOR has saved for others—

Saves $7.06 per ton. The Keystone Brass Works, Inc., slashed cleaning costs 67% with a Wheelabrator Tumblast. Annual production only 550 tons.

Saves 18 man-hours per ton. Wheelabrator Swing Table eliminated 4 chippers and grinders, saved $4,644.00 annually cleaning only 43 tons monthly for a Canadian steel foundry.

Saves $2.31 per ton. Cleaning only 1.92 tons daily, a Wheelabrator Tumblast effected savings more than sufficient to repay investment for the Welsbach Corp. A 45 minute wet tumbling job is now cleaned in three to four minutes.

3 Molder Shop Saves $5250 Annually— Paterson Brass Mfg. Co. reduced daily cleaning room man hours from 16 to 2 by installing a Wheelabrator Tumblast to replace wire brushing.

POPULAR MACHINES used in SMALLER FOUNDRIES

Wheelabrator Tumblasts—Made in eight standard sizes (1 cu. ft. to 63 cu. ft.) for cleaning castings sufficiently rugged to withstand a gentle tumbling action. There's a Tumblast just right for *your* job.

Wheelabrator Swing Tables—Particularly suitable for the foundry with a low daily volume of a wide range of large and small castings. The most versatile cleaning machine ever built. Hundreds in use.

Visit us - Booth 1817
at the FOUNDRY SHOW

FEMA

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Indiana

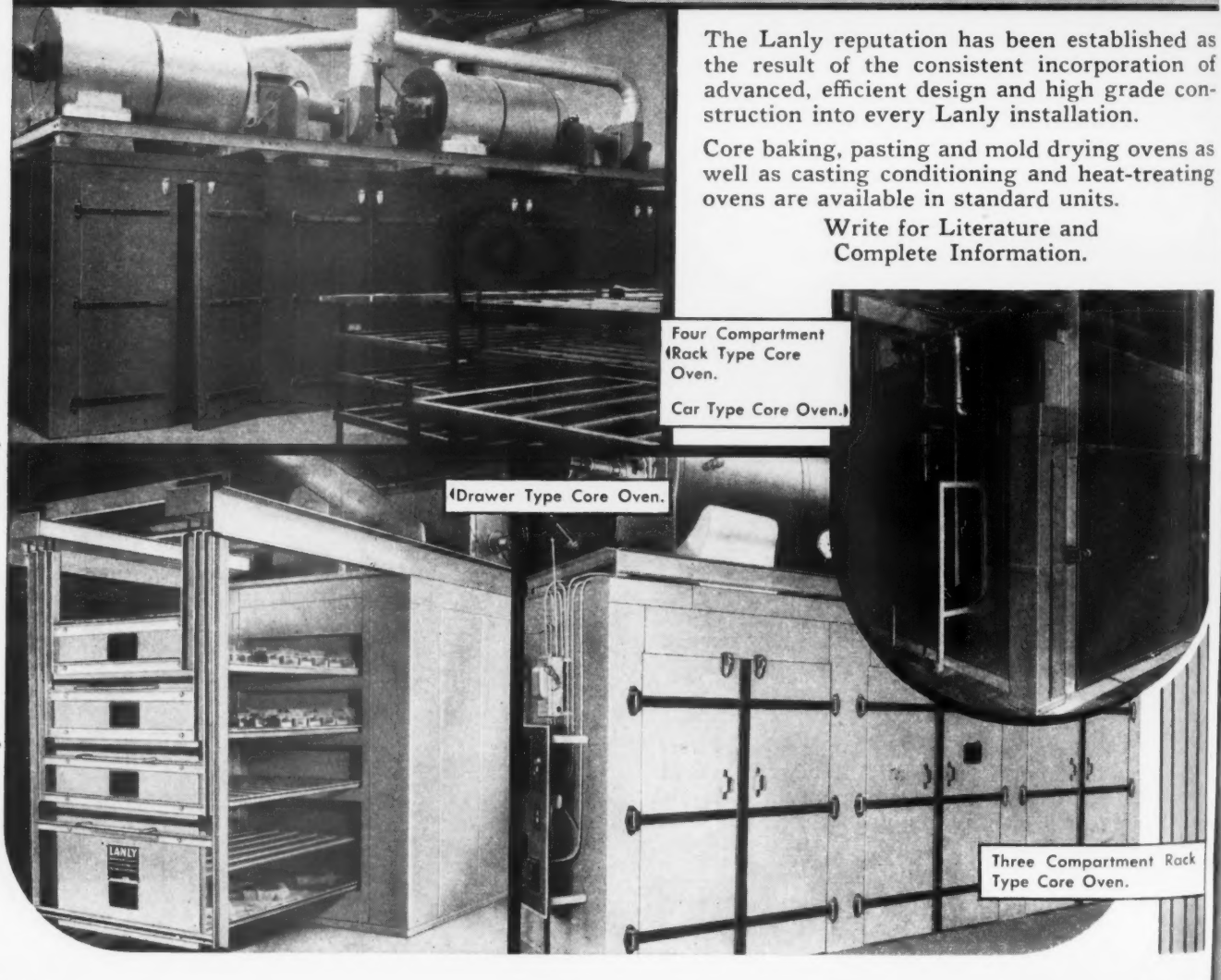
CLEANING EQUIPMENT

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.



WRITE YOUR OWN TICKET

On Grinding Wheel "Specs"

BESLY TITAN
No. MM 421
Specifications
(Once the "Specs" are established, you can re-order quickly by code number—certain that every wheel will be exactly the same—job-fitted—a perfect match for the needs of your work.)

You know the results you want in your grinding. Besly-Titan is organized to formulate wheels which will do it *your* way—fitting the requirements of the job with wheel specifications that will do it . . . material, wheel-speed and innumerable other factors considered. That's what we call *job-fitting*. Sounds like a luxury . . . but *job-fitted* Besly-Titan Wheels *cost you no more* than "stock" wheels—and delivery in just a few days is an organized routine.

Free-cutting, long-wearing Besly-Titan Abrasive Wheels and Discs are accurately bonded to snag or finish at grinder speeds available in your foundry. You'll find they save time, labor and materials on every operation.

You'll want to check the production and quality-boosting possibilities of this set-up . . . Write for complete information and individual formula recommendations, including Trial Order Plan.

BESLY-TITAN

ABRASIVE WHEELS AND DISCS

Are "Job-Fitted" for the Foundry

BESLY-TITAN

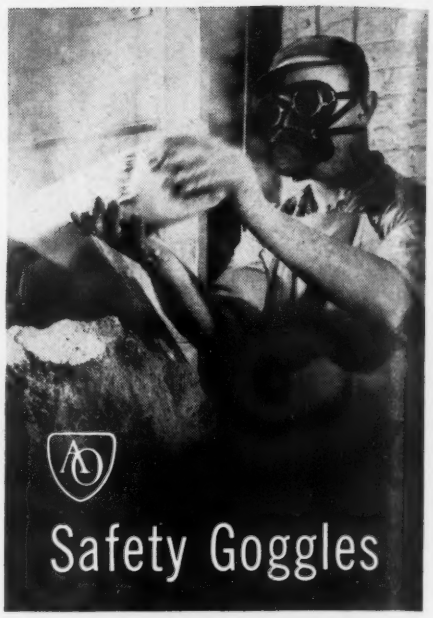
BESLY-WELLES CORPORATION

Established as CHARLES H. BESLY and COMPANY in 1875

20 N. Wacker Drive, Dept. F **Chicago 6, Illinois**

Representatives in Principal Cities

TWO SCREENS



GIVE EYES DUST-FREE PROTECTION

WITH THE

AO 306 DUST GOGGLE

Here's a goggle that does a top job of keeping workers' eyes free of fine dust particles and powders that irritate and contaminate. How? By a 150 mesh wire screen, set behind a 16 mesh screen. What's more, the "306" provides secure safety against sparks and flying particles . . . exceptional wide-angle vision . . . good ventilation and comfort. Your nearest AO Safety Products Representative can supply you.

QUICK FACTS

VENTILATION—Wire screen ventilators around eyecups provide ample ventilation—help keep lenses from fogging.

MASK—Flexible, plastic and bound at edges with soft sponge rubber, covered with pliable corduroy. Combines maximum comfort with tight fit.

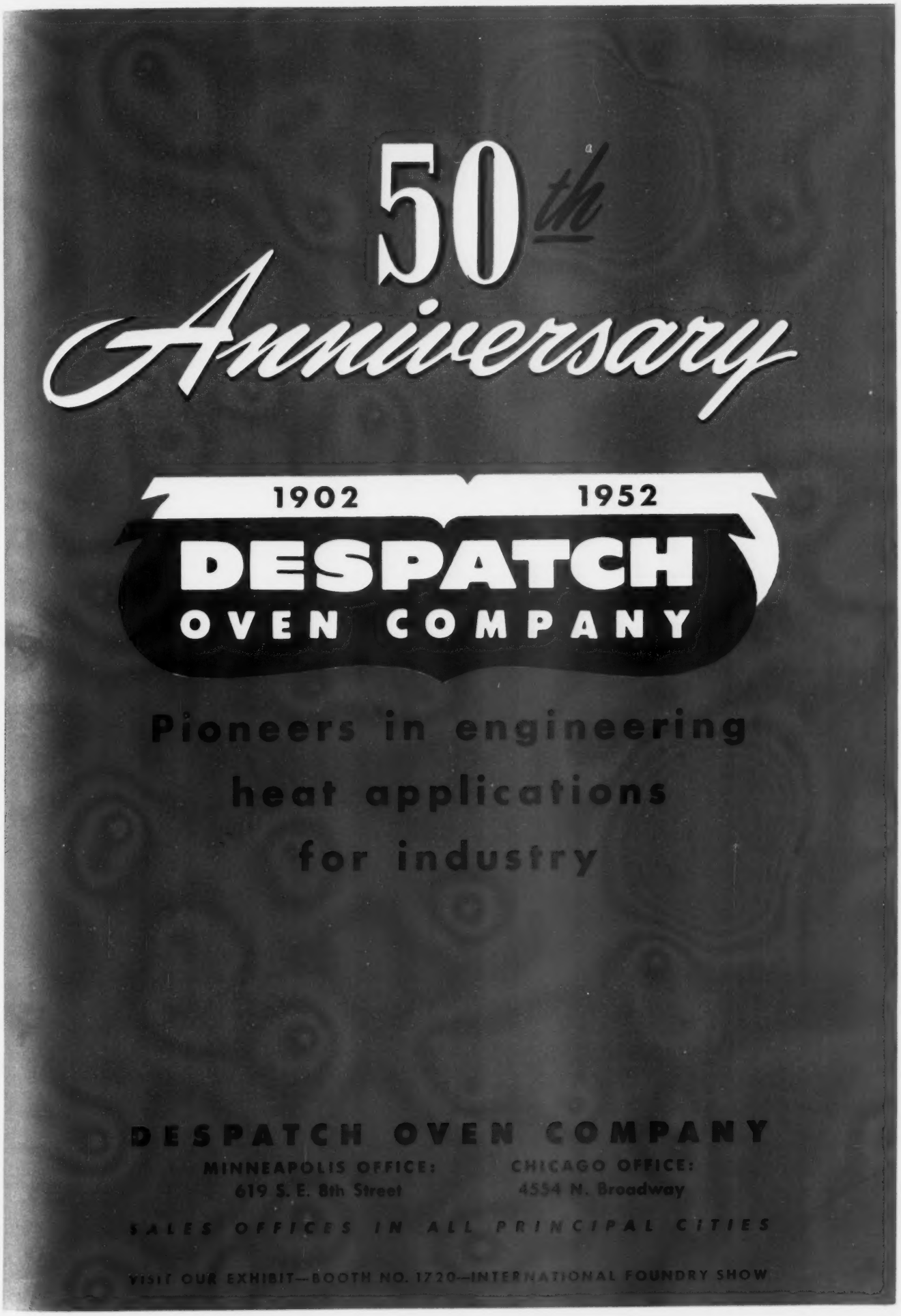
LENSES—50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar in medium, dark or extra dark shades.

SIZES—Specify No. 306 for large or medium features, No. 308 for small features.

American Optical COMPANY

SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES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Pioneers in engineering
heat applications
for industry
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MINNEAPOLIS OFFICE:
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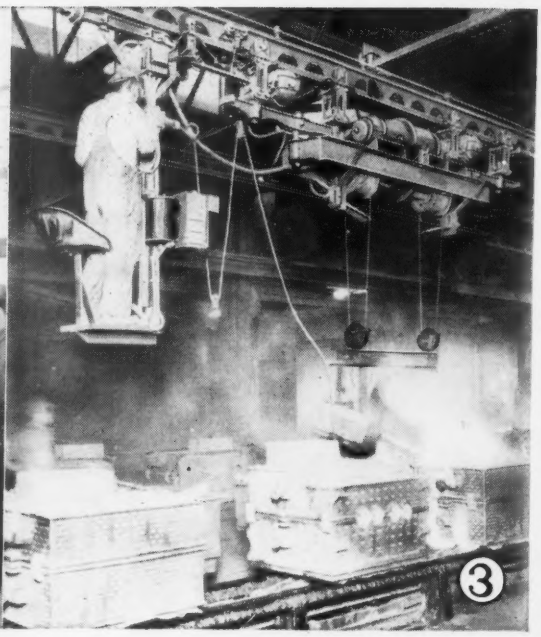
4554 N. Broadway
SALES OFFICES IN ALL PRINCIPAL CITIES
VISIT OUR EXHIBIT—BOOTH NO. 1720—INTERNATIONAL FOUNDRY SHOW



In FOUNDRIES *of every type*

POURING IS EASIER • FASTER • SAFER *with* CLEVELAND TRAMRAIL

Hundreds of foundries have speeded pouring and made the work easier and safer with Cleveland Tramrail overhead materials handling equipment. Why not check and see what it can do for you?

1 Small gray iron

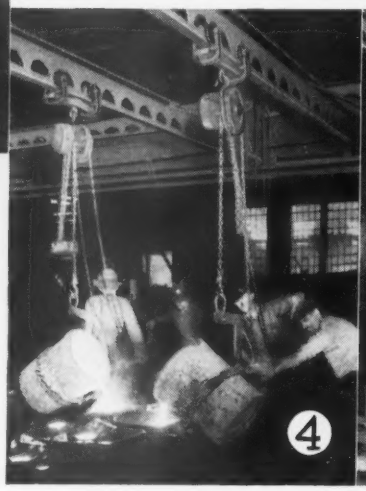
2 Centrifugal pouring

3 Large scale continuous production

4 Large malleable

5 Brass and bronze

6 Large gray iron



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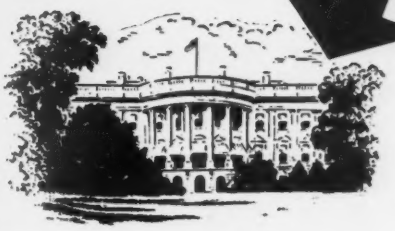
THE CLEVELAND CRANE & ENGINEERING CO.
3812 East 286th St. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

For over 10 years a steady user of...

BS&B Foundry Flasks

E. L. LeBARON FOUNDRY CO. · · · Dampers For The White House



Pictured above ...the cope and drag sections of BS&B medium weight flasks made up and ready for placing preparatory to casting.

The E. L. LeBaron Foundry Company, Brockton, Massachusetts, has placed 27 fireplace dampers in the entirely renovated executive mansion in Washington, D. C. BS&B Foundry Flasks were used in casting these patented dampers. LeBaron makes castings of their own, and for outside customers. This requires a variety of flask sizes adaptable to jobbing work. For over 10 years BS&B has supplied LeBaron with new sizes and replacements. While BS&B flasks are designed to permit customers interchanging them with any other type of flasks, already in use, LeBaron is now replacing older equipment with BS&B flasks . . . because BS&B flasks have proved satisfactory in overall operation and maintenance costs.

Designed and Fabricated to Eliminate Excessive maintenance . . . only BS&B heavy duty foundry flasks combine these features to make it a BS&B exclusive—welding of bearing strips both inside and out . . . cast steel trunnions . . . cast steel pin lugs and clamp lugs. Tailor made to your requirements.

We can deliver without long waiting periods, light, medium or heavy duty flasks—round, square and rectangular shapes. Any type of pin and bushing arrangement can be supplied to meet customer specifications.

Write for FREE BS&B Foundry Flask Handbook

A handy catalog and useful foundryman's "bible" . . . includes easy-to-order system.

Foundry Flask Division Dept. 7-AR5

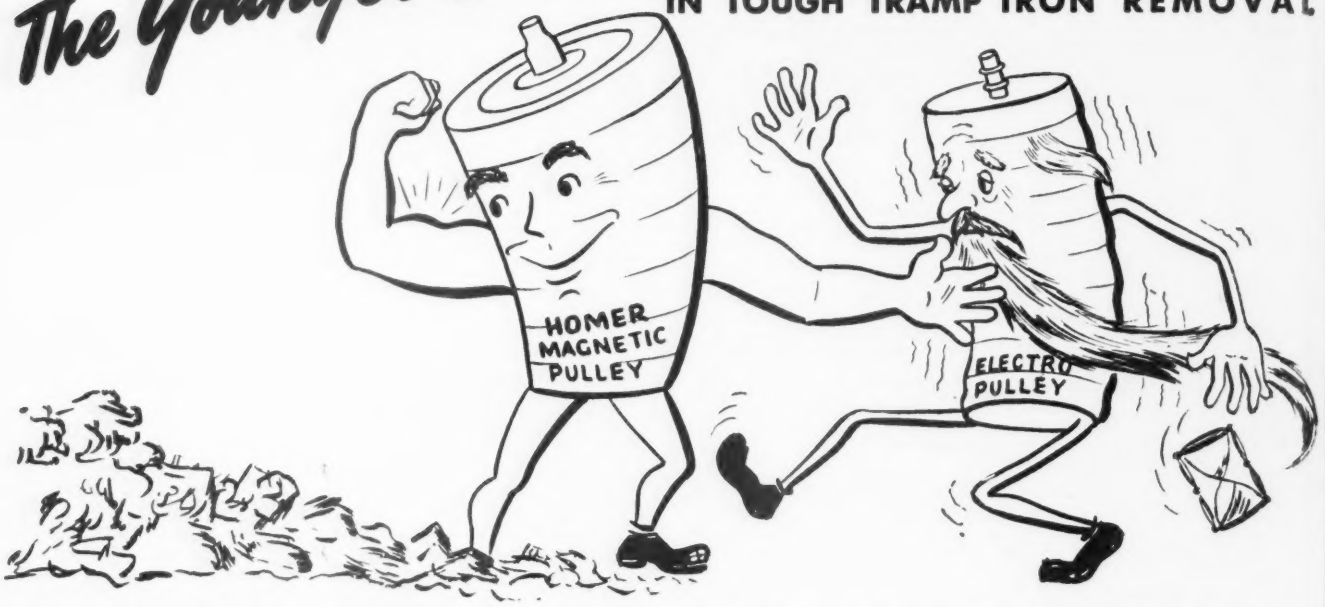
FOUNDRY BS&B FLASKS

BLACK, SIVALLS & BRYSON, INC.

7500 East 12th Street, Kansas City 3, Missouri

The Younger Generation takes over!

IN TOUGH TRAMP IRON REMOVAL

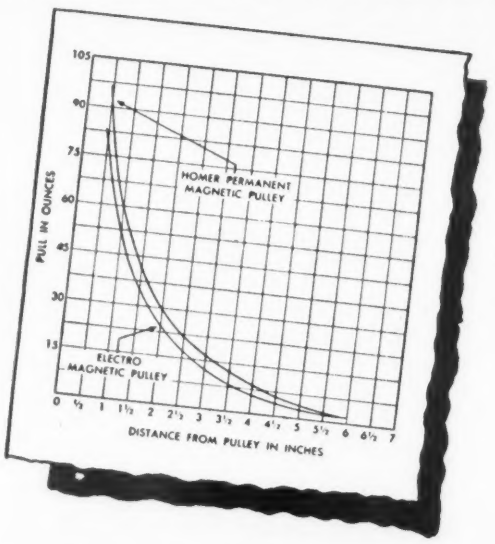


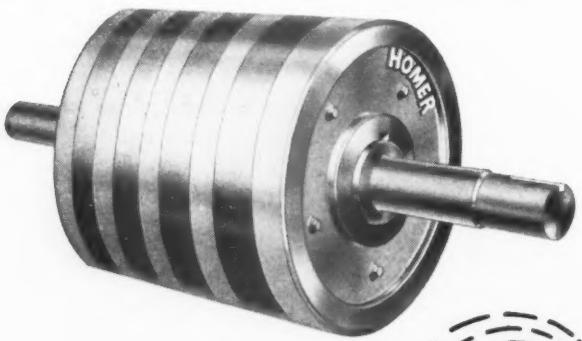
GUARANTEED HOMER PERMANENT MAGNETIC PULLEYS

Greater Efficiency with Practically No Maintenance Cost are yours, when you specify HOMER, "Power-Plus" heavy-duty permanent magnetic pulleys, for your tough jobs of separating ferrous, from non-ferrous materials.

Homer "Power-Plus" heavy-duty pulleys are always alive and on the job — day and night, protecting expensive machinery and heavy capital investments. Homers are not affected by hot or cold, wet or dry locations and you eliminate costly motor-generator sets and "down-time" in replacing burned-out pulley coils.

If Homer recommends your installation — Homer will guarantee its recommendation . . . by comparison, Homers are proved best. Literature, recommendations and estimates for the asking.





Homer Permanent Magnetic Pulleys are available in Standard and Heavy-duty sizes of 12", 15", 18", and 20" diameters, with belt widths from 4" to 60". Sizes in 24" and 30" diameters available for Light, Standard or Heavy-duty service, with belt widths from 20" to 60".

MAGNETIC PLATES
MAGNETIC PULLEYS
MAGNETIC DRUMS

HOMER

MAGNETIC TRAPS
MAGNETIC DUCTS
MAGNETIC SWEEPERS

THE HOMER MANUFACTURING CO. INC., DEPT. 156, LIMA, OHIO, U. S. A.

PRODUCERS OF MAGNETIC SEPARATOR EQUIPMENT SINCE 1923

Link-Belt equipment at Cutler-Hammer foundry includes shakeout screen, bucket elevator, storage bin with vibrating screen (right); transfer belt conveyor, Revivifier and distributing belt conveyor (left).

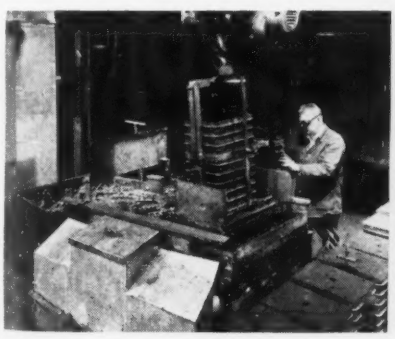
LINK-BELT mechanization
pays dividends for foundries of all sizes

Here's how one important foundry gets fast, clean, low-cost handling of sand and castings

WHETHER your foundry is large or small, mechanized handling of sand and castings offers two big advantages. First, you can produce better castings at lower cost. Equally important, you can make more efficient use of scarce manpower . . . eliminate much backbreak, improve working conditions.

For instance, consider Cutler-Hammer, Inc., Milwaukee. Their new Link-Belt-designed system prepares 15 tons of sand per hour for two stack molding machines. Careful planning has speeded production, provides good housekeeping. Central shakeout simplifies handling and sorting of castings. Despite low headroom, alterations were minor. And provision has been made for expansion.

For information on how mechanization can serve you, call the Link-Belt office near you. A Link-Belt foundry specialist will welcome the opportunity to work with you or your consultant.



Link-Belt Shakeout gives positive separation of sand and castings.

Ram-offs are minimized because sand is thoroughly aerated for easy flowing by Link-Belt Revivifier.

LINK-BELT

Conveyors and Preparation Machinery

●

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,736

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DELTA FOR Faster

OF FINER-

A COMPLETE LINE OF *Scientifically* CONTROLLED FOUNDRY PRODUCTS

DELTA products for the foundry are PRODUCTS OF RESEARCH. For nearly twenty years many important scientific developments . . . valuable contributions to the advancement of foundry practices . . . have originated in DELTA'S laboratories where the most modern scientific facilities are employed in a continuing program of product research, development and standardization.

Every DELTA Foundry Product is first tested by laboratory methods then submitted for use and final approval in ACTUAL FOUNDRY PRACTICE before it is identified with the name "DELTA".

There is no "just as good" substitute for ANY Delta Foundry Product just as there is no substitute for DELTA'S scientific controls which safeguard the quality and uniformity of all DELTA Foundry Products.

Among the many *"FIRSTS"* introduced by DELTA laboratories are Plastic-type Core and Mold Washes and, more recently, a Sand Release Agent (96-B) embodying unique and distinctive characteristics.

DELTA CONTINUES TO LEAD IN THE DEVELOPMENT OF NEW PRODUCTS FOR IMPROVED FOUNDRY PRACTICE.

VISIT US AT OUR BOOTH — NUMBER 1443
56th ANNUAL A.F.S. FOUNDRY CONGRESS & SHOW
Atlantic City, New Jersey
May 1 - 7, 1952

rProduction
R-FINISH CASTINGS

CORE AND MOLD WASHES:
FOR STEEL:
Delta Special Core and Mold Wash Base — Used by more steel foundries than all other types of washes combined.
Delta SteelKoat — a finished high fusion waterproof wash.
FOR ALL TYPES OF SAND CAST METALS:
Delta ThermoKoat — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.
Delta Z-Koat — a zirconium wash with unusual properties in contact with molten metal.
FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:
Delta GraKoat — no reaction with molten metal.
Delta BlacKoat — a black wash, free from carbon, no gas in contact with molten metal.
FOR GRAY IRON:
Delta BlacKoat S-5 — a new and different wash. Produces results, on gray iron castings, unequalled by any other wash.
FOR NON-FERROUS AND LIGHT METALS:
Delta NonferrusKoat — produces unusually smooth surface castings.

PARTING COMPOUNDS:
Delta Partex — (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.
Delta Liquid Parting—Low-cost, highly effective and lasting.

MUDDING & PATCHING COMPOUNDS:
Delta Sliktite — a light colored mud for all types of metal castings.
Delta Ebony — a black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

NO-VEIN COMPOUND:
A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

MOLD SURFACE BINDERS — LIQUID:
Delta Spray Binders — Produce dry sand mold results by surface spraying of green sand molds.

PERMI-BOND:
Eliminates Sea Coal Nuisance: The new modern scientific sea coal replacement.

DRI-BOND:
A new type of Dry Binder which provides new economies. Fast-baking, reduces veining and penetration. Can be used with old sand equally as well as with new sand.

BONDITE:
Produces a reducing mold atmosphere: Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

FOR STEEL AND GRAY IRON — Use with new sand.

96-B SAND RELEASE AGENT:
Another Foundry *"First"* by Delta. By adding 8 oz. or less per ton to your core or molding sand mixes, your sands will flow freely. 96-B is completely volatile at elevated temperatures and does not contaminate the sand.

CORE ROD DIP OIL NO. 224X:
Ties core rods and wires into the cores: Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

DELTA SAND CONDITIONING OIL:
Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixes.

CORE OILS:
High tensile, low gas, faster baking, exceptionally economical to use.

Get the Facts...
Delta Technical Men will be at the booth to answer your questions and discuss with you problems relative to foundry practice. Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.
MILWAUKEE 9, WISCONSIN

all together, to 1952

Famous CORNELL CUPOLA FLUX

Over 34 years' success in casting improvement.

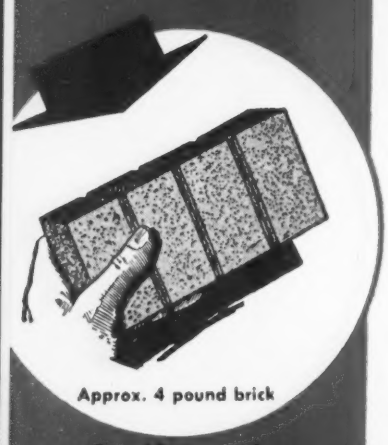
● A small investment in Famous Cornell Cupola Flux pays off BIG by boosting the quality of your castings and reducing rejects.

Famous Cornell Cupola Flux cleanses, desulphurizes molten iron and makes it more fluid. Keeps slag fluid. *Castings come sounder, cleaner and easier to machine.*

Furthermore, it keeps cupolas cleaner and increases efficiency of operation. Bridging over is practically eliminated. Drops are cleaner. And there is less erosion of brick or stone lining due to formation of a glazed or vitrified surface on cupola lining. *Labor and down time for maintenance is reduced amazingly.*

THE SCORED BRICK FORM makes fluxing of molten iron a matter of seconds, and the correct amount can be used for any size of cupola charge—no waste.

WRITE FOR BULLETIN NO. 46-B



Approx. 4 pound brick

Pre-Measured

SCORED BRICK FORM

(Approx. 4 pound brick)

LET'S GO-

Foundry Show!

ATLANTIC CITY, MAY 1-7

Clifford B. Cornell

Our latch string is out at *Suite No. 200-A, Hotel Dennis,* for your entertainment after closing hours during show.

• *These are the days when foundrymen get together for new ideas, new acquaintances and reunion of old friends in the foundry industry.*

For a real welcome visit us at **BOOTH NO. 801-805.**

Clifford B. Cornell

Sec'y-Treas.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES

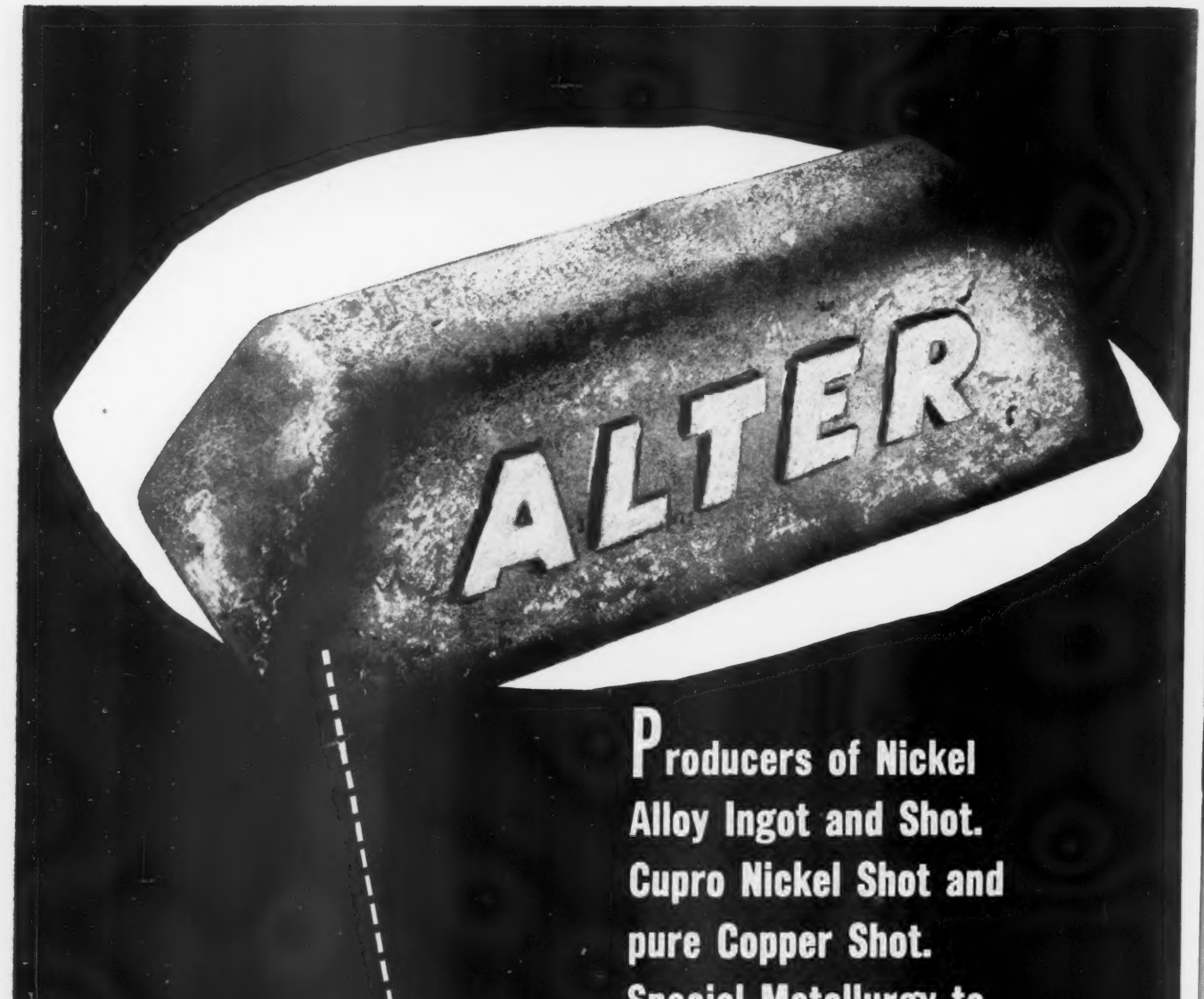
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.



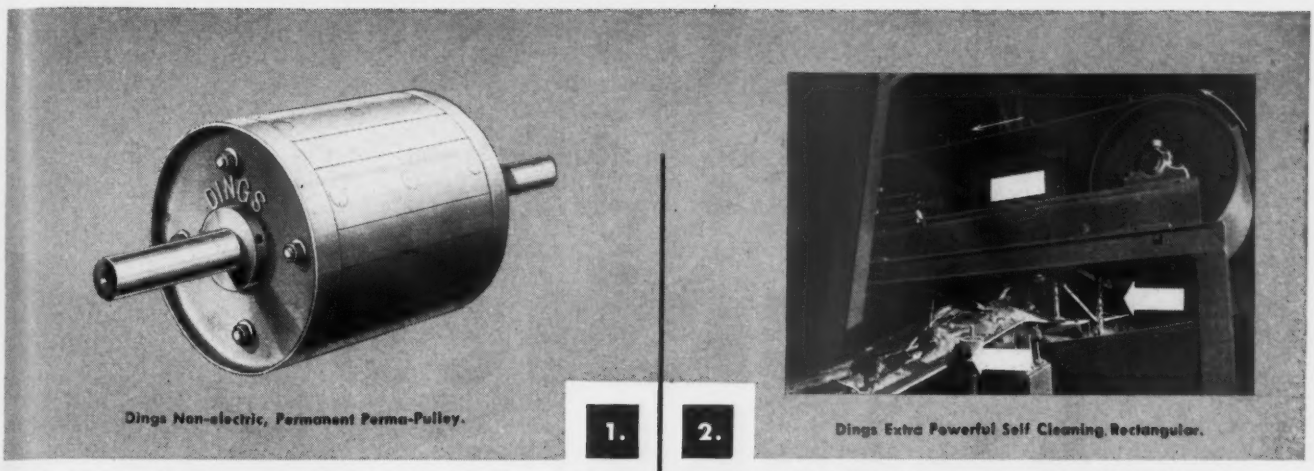
Producers of Nickel Alloy Ingot and Shot. Cupro Nickel Shot and pure Copper Shot. Special Metallurgy to suit our customers needs as well as standard Master Alloys. Highest standards of Metallurgical Control.

Over 50 Years

ALTER COMPANY

1701 ROCKINGHAM ROAD DAVENPORT, IOWA

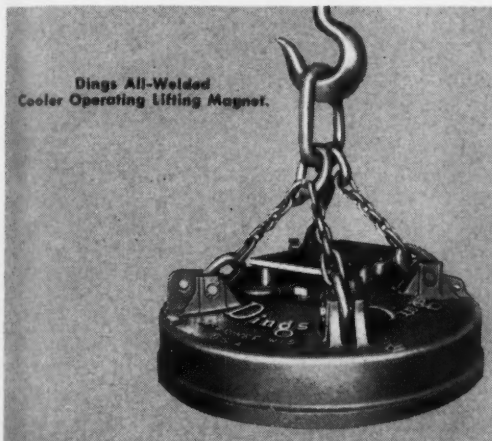
(PHONE 6-2561)



Dings Non-electric, Permanent Perma-Pulley.

Dings Extra Powerful Self Cleaning Rectangular.

1. 2. 3. 4.



Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks"*. Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wisconsin

SEND THIS COUPON
OR DROP A POSTCARD

Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
☐ RECTANGULAR ☐ "HOLD-TITE" plus

Article on "Lowering cleaning room costs through the use of magnetic chucks"

NAME.....

COMPANY.....

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Takes the Toughest Abrasion

Lives through it! and Laughs at it!

BULL DOG Sand Blast Hose

is the hose that your most exacting requirements designed

Construction Features Include:

A tube of highest grade abrasion-resistant rubber that is also static conducting; a carcass fashioned of strong, rubberized duck plies which give wall support to the hose; a highly abrasion-resistant cover and capped ends.

Get in touch with your supplier today . . . put BULL DOG SAND BLAST HOSE to work for you as soon as you can.

FOR HERE'S the hose that takes the "gaff" . . . withstands the toughest use and abuse . . . and comes through with flying colors.

You can't equal its long-lived performance for pressure blasting with sharp sand, steel shot or other abrasive materials at high velocities.

And you will find it of equally unsurpassed stamina in the cleaning or finishing of castings, stone, glass or other materials.

BWH DEPENDABLE RUGGEDNESS

Another Quality Product of

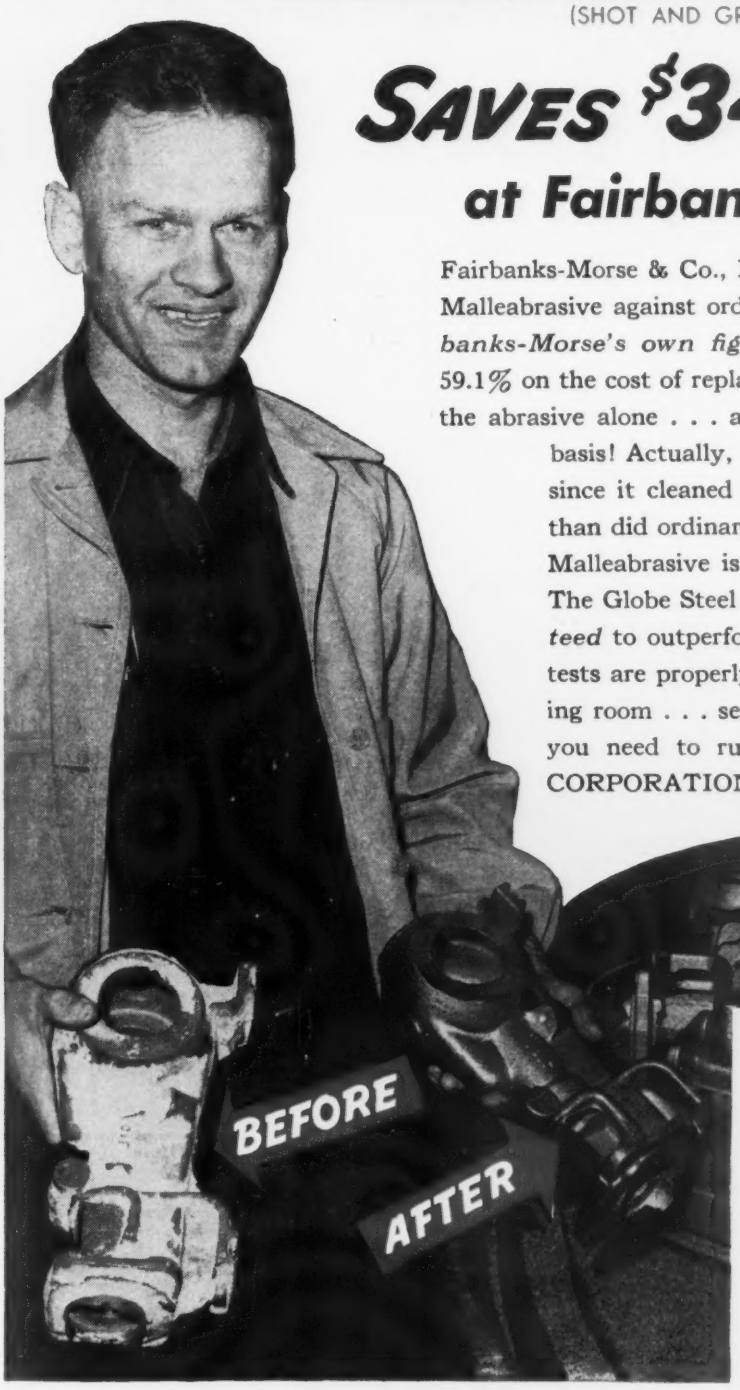
BOSTON WOVEN HOSE & RUBBER COMPANY

Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

MALLEABRASIVE®*

(SHOT AND GRIT)



SAVES $3450.00 A YEAR at Fairbanks-Morse & Co.

Fairbanks-Morse & Co., Freeport, Ill., took us up on our offer to test Malleabrasive against ordinary grit in their own shop. Here are *Fairbanks-Morse's own figures:* During the test, Malleabrasive saved 59.1% on the cost of replacement parts . . . saved 14.6% on the cost of the abrasive alone . . . adding up to a total of $3454.40 on a year's basis! Actually, Malleabrasive's advantages are even greater, since it cleaned an average of 10.8% more tonnage per hour than did ordinary grit!

Malleabrasive is the *original* long-life abrasive pioneered by The Globe Steel Abrasive Co., Mansfield, Ohio. It is *guaranteed* to outperform ordinary shot and grit when comparative tests are properly run. Test Malleabrasive in your own cleaning room . . . send for your free kit, containing all the forms you need to run this impartial test. Write: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

Here's why Malleabrasive saves you money:

MALLEABRASIVE

- *is designed for modern cleaning equipment*
- *wears out fewer machine parts*
- *lasts 2 to 4 times longer*
- *reduces machine down-time*
- *reduces cleaning costs up to 50%*
- *increases output of cleaned castings*

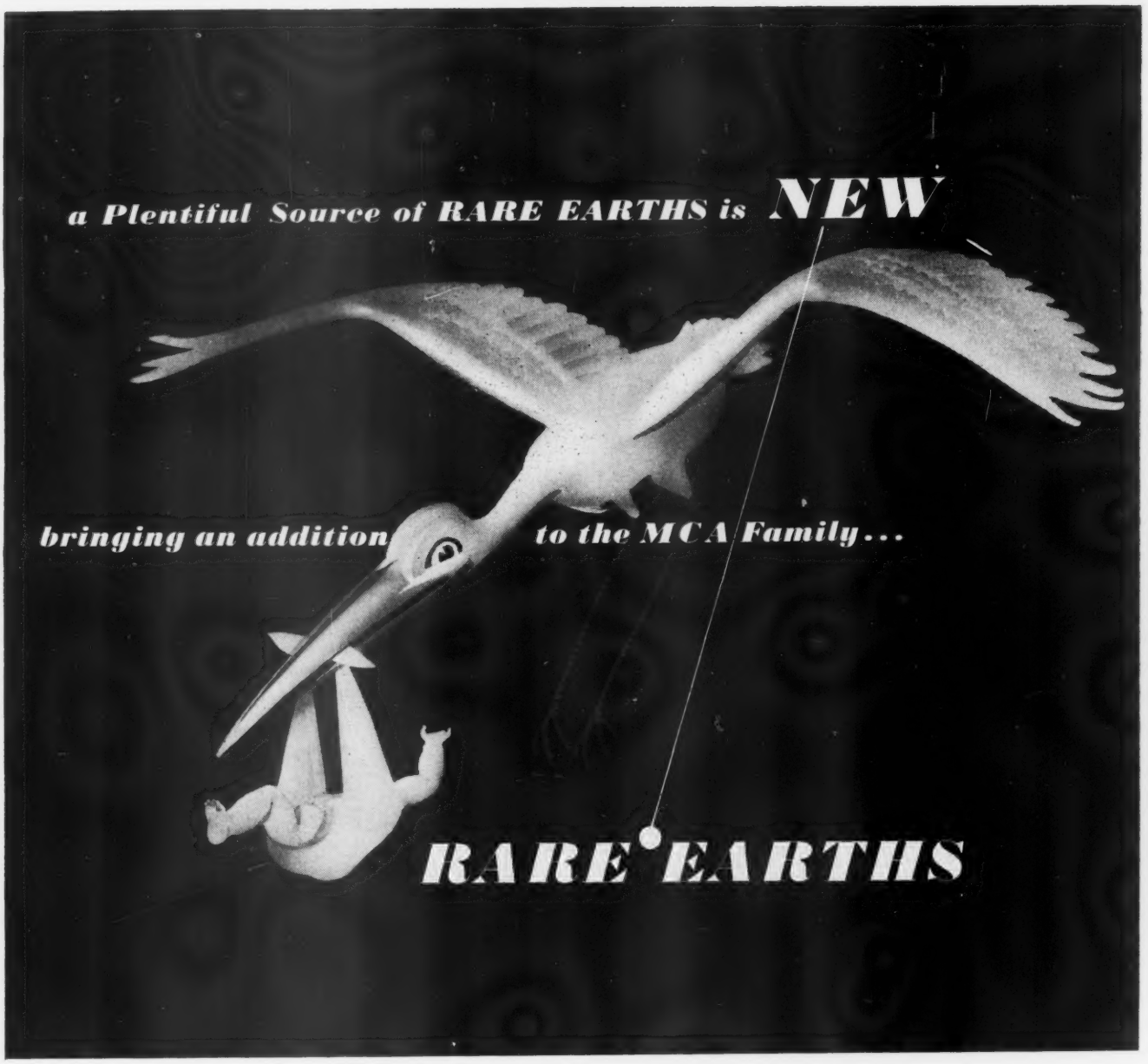
Packed in orange striped 100-pound bags with this tag

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

*U. S. Patent #2184926 (other patents pending)



RARE EARTH" materials, which have commanded great and growing interest even as imported from foreign sources, can now be produced in abundance within the United States.

The Molybdenum Corporation is able to report that highly modern facilities are being installed and rapid growth provided for. Technical research, looking toward new and better employment of these materials, has been extensive and will continue. Consultation with present or prospective users is invited.

As a supplier of Molybdenum, Tungsten, Boron, and other alloying materials, the Molybdenum Corporation welcomes correspondence on any application or requirement.

AMERICAN Production, American Distribution, American Control, Completely Integrated

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco

Sales Representatives: American Steel and Supply Co., Chicago; Edgar L. Fink, Detroit; Brumley-Donaldson Co., Los Angeles, San Francisco

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N.J.

Works: Washington, Pa.; York, Pa.

MOLYBDENUM **CORPORATION OF AMERICA**
Grant Building Pittsburgh, Pa.

MCA

Now! TOCCO* Induction Melting Furnaces for Precision Casting

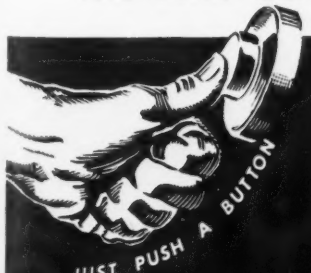
One of the TOCCO Induction Melting Furnaces used at Arwood Precision Casting Co. Note TOCCO control station in background.

● Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

- ★ Stepless power control
- ★ Extremely Rapid Melting
- ★ High Efficiency on Intermittent Operation
- ★ Good Mixing because of Natural Agitation
- ★ Extremely Low Alloy Loss
- ★ No Carbon Pick-up
- ★ No Contamination when Composition of Charges is Changed
- ★ High Reproducibility of Results
- ★ Minimum Space Requirements
- ★ No Special Installation Charge
- ★ Simple, Safe Operation
- ★ Clean, Comfortable Working Conditions

If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY



TOCCO

"Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW **FREE** BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. F-5, Cleveland 1, Ohio

Please send copy of "The Case for TOCCO Induction Melting."

Name_____

Position_____

Company_____

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City_____ Zone____ State____

get up to date on Grinding....BOOTH 1104

Men who have lived for years with portable grinders and grinding problems will demonstrate the advantages of CP Super Cycles . . . *the electric grinders that remove more metal, in shorter time and with lower maintenance cost than any other type of portable grinder.*

If you use six or more portable abrasive tools, be sure to visit Chicago Pneumatic's Booth 1104 at the Foundry Show, see Super Cycle in action.

In addition to working demonstrations of CP Super Cycle Grinders—CP Hicycle Grinders, Pneumatic Grinders, Sand Rammers and other CP Foundry Equipment will be on display in Booth 1104.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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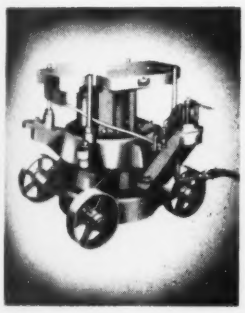
CP Fiftieth ANNIVERSARY

YOU'LL SEE THESE DAVENPORT MOLDING MACHINES IN ACTION

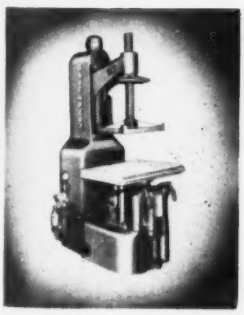
"DAVENPORT" JOLT ROLL OVER DRAW MOLDING MACHINE

SEE this powerful ROLL-OVER which is FULLY ENCLOSED for mechanical protection, with Centrally located control column, Balanced roll over arm, Positive air operated flask clamps, Automatic flask leveler, Accurate positive draw, Automatic lubrication, Valveless jolt, Self-cleaning striking pads and many other features.



"DAVENPORT" JOLT STRIPPER PIN-LIFT

SEE—so that you can evaluate this versatile "Davenport" PIN-LIFT molding machine with Adjustable lift pins, Valveless jolt, Self-cleaning striking pads, Adjustable precision draw, Automatic lubrication and many other features. A machine that can produce drag molds as well as copes.



"DAVENPORT" JOLT SQUEEZE PIN-LIFT

SEE this machine that is brand new to the foundry industry. The Swing arm, the Screw adjustment for fast job change, the Electrically controlled squeeze, Automatic lubrication, Valveless jolt, and many other features which make this JOLT SQUEEZE STRIP machine so outstanding.

BOOTH 1449

INTERNATIONAL FOUNDRY SHOW

MAY-1-7-1952

AMERICA'S OUTSTANDING FOUNDRY MOLDING MACHINES

If YOU are unable to attend the show, let us send you our catalog.

DAVENPORT MACHINE AND Foundry Company
DAVENPORT IOWA U. S. A.

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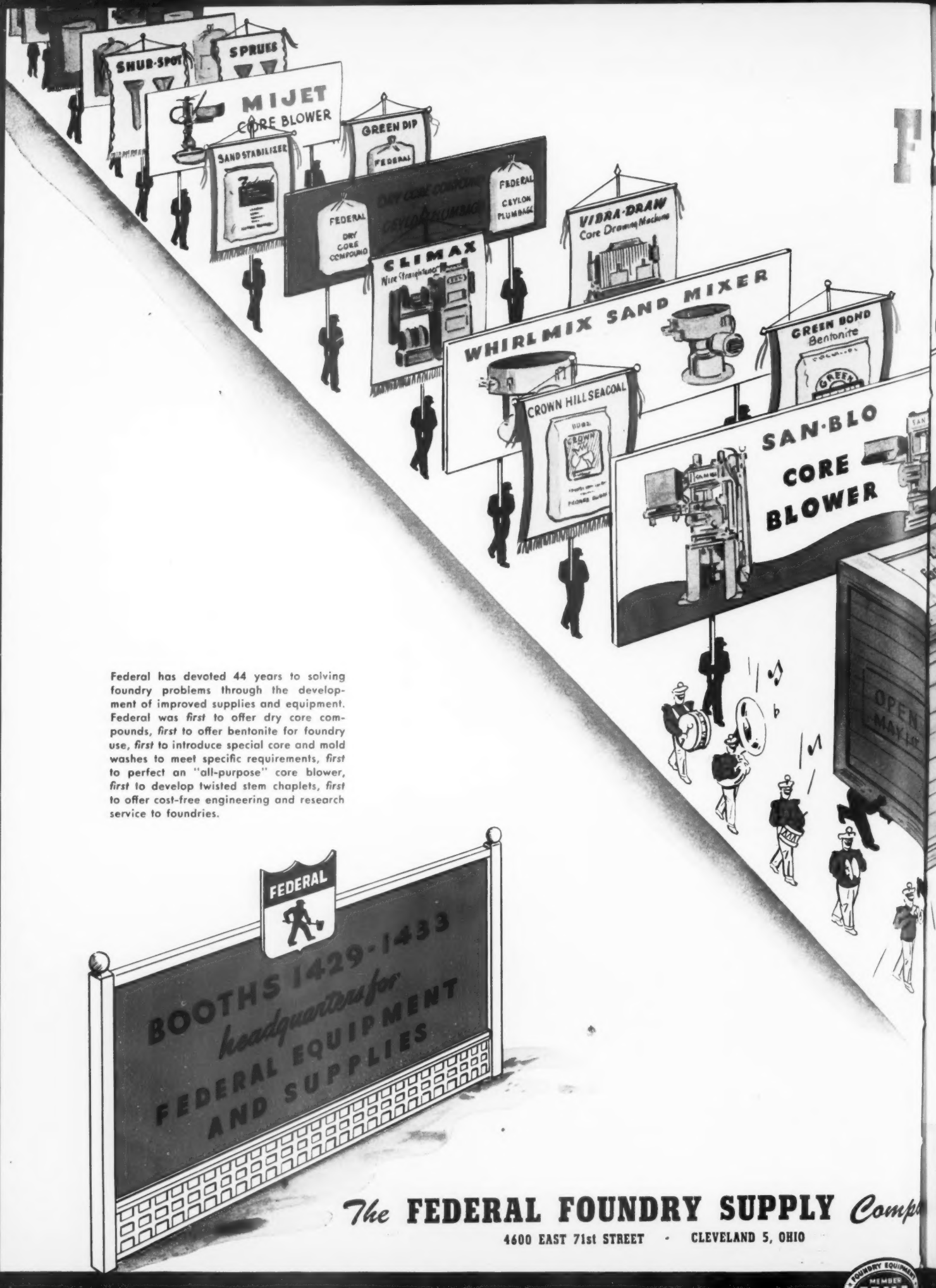

Federal has devoted 44 years to solving foundry problems through the development of improved supplies and equipment. Federal was *first* to offer dry core compounds, *first* to offer bentonite for foundry use, *first* to introduce special core and mold washes to meet specific requirements, *first* to perfect an "all-purpose" core blower, *first* to develop twisted stem chaplets, *first* to offer cost-free engineering and research service to foundries.

The **FEDERAL FOUNDRY SUPPLY** *Compa*

4600 EAST 71st STREET · CLEVELAND 5, OHIO

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FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

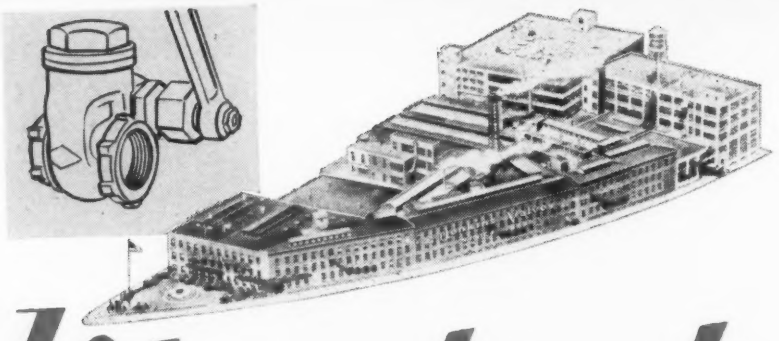
DERAL'S ON THE MARCH!

with a big parade of outstanding foundry equipment and supplies . . . *including its sensational* "SURPRISE PACKAGE"

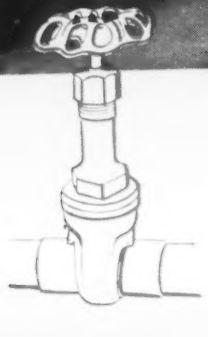
There'll be plenty for you to see at Federal's booth this year! Especially if your foundry is planning a modernization or expansion program. For the Federal exhibit will include a variety of efficient foundry machines—core blowers, core drawing machines, sand mixers, wire straighteners and others—machines that will help you boost production *and* reduce costs. You'll also learn about the latest developments in Federal's famous line of foundry supplies—Green Bond bentonite, Crown Hill seacoal, Federal core and mold washes, core binders, plumbagos and blackings—supplies that will improve the quality of your castings. In addition, there's the "Surprise Package"—the big feature of Federal's exhibit—something every foundry has been asking for. By all means, don't miss it!

Yes, Federal has a mighty worth-while show for you. Plan now to stop in. And what's more, why not make the Federal booth your show headquarters? You're most welcome to drop in anytime and make yourself right at home.

DETROIT CHICAGO MILWAUKEE UPTON, WYO. LOS ANGELES



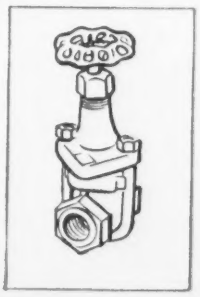
Quality starts



ROCKING action does it...better

Jenkins Bros. uses nine Detroit ROCKING Electric Furnaces to melt bronze for valves

in the furnace!



Top grade valves require top quality castings. And top quality castings require metal that is precisely right.

Jenkins Bros., makers of fine valves for almost a century, have 9 Detroit Rocking Electric Furnaces, with a combined capacity of 7700 lbs. per hour, to melt bronze of the necessary high quality.

PRECISE CONTROL OF ANALYSIS

Melt-analysis can be controlled very exactly in these great furnaces, with metal of the desired characteristics produced in heat after heat. Accurate temperature control allows establishment of the most advantageous pattern for operation, and duplication of that pattern for each melting cycle. The rocking action of the furnaces assures homogeneous melts and a more complete utilization of generated heat because of the flow of molten metal back and forth on the lining.

NOTE THESE ADVANTAGES

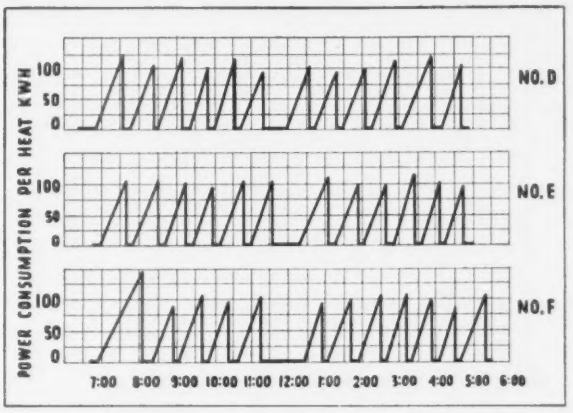
Other important advantages of Detroit Rocking Electric Furnaces are economy of power consumption, minimum heat loss, less metal shrinkage, fewer scrap castings, more heats per shift or working day, reduced out-of-production time because of long refractory wear and simple shell replacement, trouble-free operation.

Detroit Electric Furnaces range from 10 lbs. to 4000 lbs. capacity, individually designed to fit your plant's electrical specifications. They melt ferrous and non-ferrous metals with equal efficiency.

GET FULL INFORMATION

For full information on the advantages of Detroit Electric Furnaces for your foundry, send us your operating data. We'll give you full details. Write today.

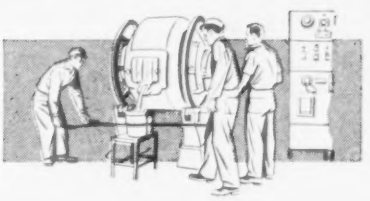
OPERATING RECORDS OF 3 JENKINS BROS. FURNACES



Each furnace melted 4½ tons of bronze in 10½ hours. KWH consumption respectively, 1312, 1272, 1269.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.



melts, faster melts

A ZIG-ZAG Conveyor in the core department of a large foundry. Baked cores are transferred direct from ovens to conveyor carriers. While cooling, cores move via upper elevation to checking and ganging benches. This installation, over 500 feet overall and constructed entirely of stock sections, is powered by two synchronized drive units.

with R-W "Zig-Zag"® Continuous Power Conveyor

Anything as fragile as a core requires a lot of careful handling. A sudden bump or jerk can mean extensive breakage and the loss of costly production time. But with a ZIG-ZAG Continuous Power Conveyor, handling is reduced to a minimum and the danger of breakage all but eliminated because ZIG-ZAG moves along smoothly and jerk-free at any speed from 1 in. to 60 ft. per minute.

And another important fact to consider—ZIG-ZAG helps to solve labor and production problems, too . . . it relieves women workers of heavy lifting while releasing men for other important tasks . . . it smooths out production bottlenecks resulting from cramped, overloaded floor space.

ZIG-ZAG operates just like "water through a pipe"—it's a steel tube-like track through which travels a specially constructed motor-driven chain carrying unit loads up to 125 pounds each. And it's highly flexible too—if changes or relocation are required you can take it down here and put it up there, and in most cases *use all of the parts!*

* * *

Learn how patented ZIG-ZAG can save money in your core department. Send for details—or better yet, have an R-W engineer consult with you at no obligation.

Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

AURORA, ILLINOIS, U.S.A. *Branches in all principal cities*

SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT
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ELEVATOR DOOR OPERATING EQUIPMENT

1880 RICHARDS WILCOX R-W AURORA TRADE MARK Reg. U. S. Pat. Off. 1952

OVER 72 YEARS

for much higher efficiency... at much lower costs... first check PEKAY

PEKAY

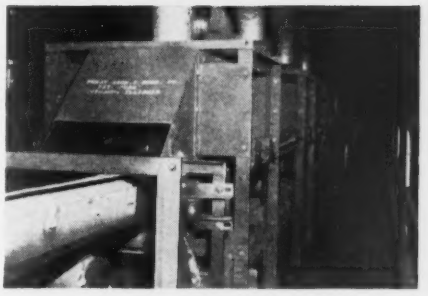
POWER PLOW

for perfect control and distribution of material flow at all times . . . *never* any starved hoppers . . . smaller bins make work on molds easier, cut down on mess and dirt, practically eliminate caking and packing . . . a cleaner, easier, maintenance-reducing and labor-saving operation, proved out in continuous heavy-duty use. Let PEKAY engineers show you specific ways in which *your* operation can profit.

PEKAY

Mixer-Muller

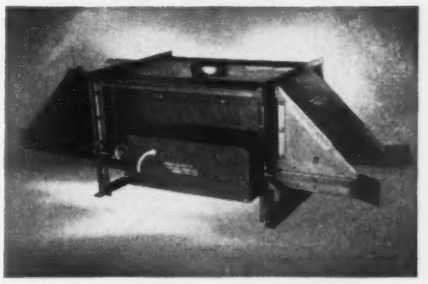
in actual use, has done this: stepped up Green Compression Strength from 10.5 to 12 lbs. . . . boosted Permeability from 100 to 110 . . . cut Bonding Material use in half . . . maintained correct Moisture Content . . . and delivered this *better* sand at an increase of volume per hour of 85%! Easy to install, too . . . normally takes only 100 man-hours, placed anywhere along your belt system without major reconstruction. Inspection is simple . . . maintenance costs practically vanish.



PEKAY

AIRATOR

for exceptionally long life, and much less frequent replacement of wearing parts . . . thoroughly aerates, cuts and fluffs sand —lets you say good-bye to lump trouble for good . . . a compact but ruggedly built piece of equipment . . . only 25 man-hours required to install with your present belt system . . . easy inspection through side-plate for all moving parts. A low-cost way to consistently better production.

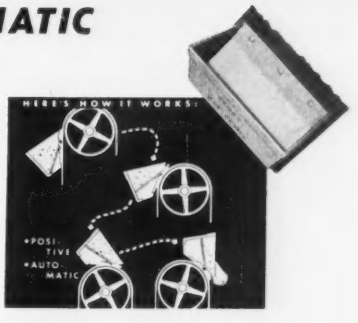


Limitator — INDICATOR-CONTROL for GRANULAR & CRUSHED MATERIALS

gives *positive, adjustable control* of sand (and any other granular or crushed materials)—with *no holes to cut* in your bin or hopper! Accurately indicates the level to be maintained in bin . . . quickly adjustable to any desired level by outside Selector Screw . . . practical, sturdy, trouble-free construction . . . no electrical parts in bin or material . . . easily adapted to activate warning bells, buzzers, lights, feed gates.

PEKAY *M-T-MATIC* ELEVATOR BUCKET

speeds operations, cuts costs by "can't fail" complete emptying on *every* trip. Thousands in successful use . . standard sizes to fit your conveyor.



★ ***WRITE TODAY FOR COMPLETE DETAILS ON THIS BETTER FOUNDRY EQUIPMENT — AND ON THE REVOLUTIONARY NEW "TROFF-O-MATIC" TROUGHING CONVEYOR!***

PEKAY MACHINE & ENGINEERING CO.

100 N. LA SALLE STREET CHICAGO 2, ILLINOIS

Money-Saving monolithic linings for acid electric furnaces and ladles give cleaner steel

CARO-LINE

MONOLITHIC REFRACTORY LINING

DEVELOPED BY

IRONTON . . . is a proved-in-practice material. You take no chances when you use it to line your acid electric furnaces, side-blown converters, and ladles handling malleable iron, alloy iron, or electric steel.

CARO-LINE is a highly siliceous refractory blended with ceramic minerals to give a tough, thorough bond. That means exceptionally high refractoriness, volume stability at high temperatures, and no tendency to slag off. Your ladles work cleaner. Your steels are almost completely free of slag inclusions.

CARO-LINE is fine-grained . . . works smoothly as a ramming material. The cost records of leading foundries prove it far superior to clay-ganister mixtures. CARO-LINE cuts labor costs, gives longer service. Monolithic linings have no weak joints for slag attack, so you seldom lose castings due to slag inclusions.

Ironton representatives can tell you more. Get in touch with the nearest office listed at the right.

Call the Ironton Representative in the city nearest you . . . .

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Our 35th Year

1917 - 1952

HIGHEST QUALITY CASTINGS ARE ANNEALED IN 48 HOURS BY THIS LARGE ELEVATOR FURNACE, ONE OF TWELVE AT THIS PLANT.

THREE MALLEABLE FOUNDRIES SAVE TIME, CUT COSTS WITH G-E ELECTRIC FURNACES

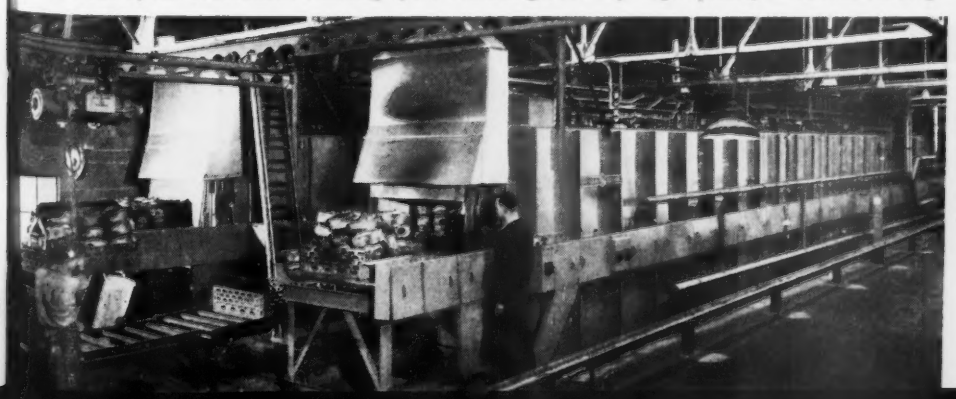
Like these three plants, you may find you can drastically cut annealing time, reduce over-all costs and produce better, more uniformly annealed malleable iron by installing G-E electric furnaces.

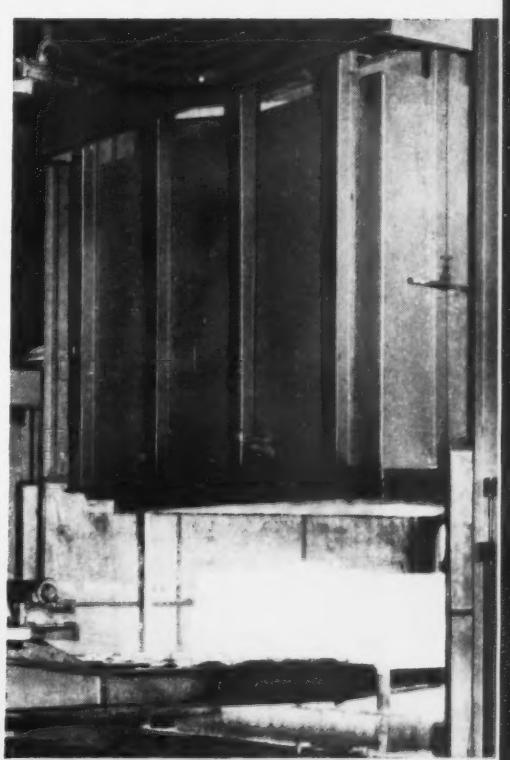
Have a cost study made on your plant by an experienced G-E Heating Specialist, as these foundries did. His findings, based on experience with many similar applications, will offer proof that a G-E electric furnace will give you the greatest long-range return for your capital investment.

You can select all your heat-treating equipment from G.E.'s complete line of electric furnaces, atmosphere equipment and handling equipment for nearly every heat-treating process. Start your plant planning by contacting the nearby G-E Sales Office for the recommendations of an Industrial Heating Specialist. Or write Sect. 720-80, *General Electric Co., Schenectady, New York.*

GENERAL ELECTRIC

26 TO 30 NET TONS of castings are annealed daily by this roller-hearth furnace on a 21-hour cycle. Automatic heating cycle control gives very high-quality, uniform castings.





ANNEALING TIME WAS CUT from 6 days to 48 hours here by using G-E bell-type furnaces. Electric heat produces better-annealed castings at a lower unit cost.

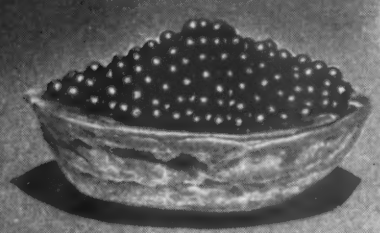
HERE'S YOUR ANSWER

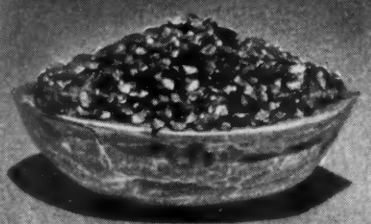
to faster, better, uniform, low-cost blast cleaning

IN A NUTSHELL

METALLIC

SHOT HI-GRADE GRIT

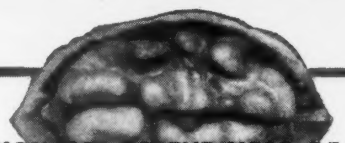




That's a broad claim. We don't expect you to accept it without substantiation. We hope you will ask us to present our proof. All we ask, is that you let it be on-*your*-job proof. Proof we know you'll believe! The only proof we want you to accept.

Like many production finishing men, perhaps you have always taken shot and grit pretty much for granted. If so, you have a surprise coming, for Hi-Grade Shot and Grit IS different—so superior, in so many ways—you can only appreciate its true value by job-testing the material yourself. That way you get proof of performance you can accept as conclusive. Order a trial quantity today. We'll let results speak for themselves. You'll find they say, "*Hi-Grade is best by test*"—your answer to faster, better, uniform, low-cost blast cleaning, in a nutshell.

Packed in 100 lb. Bags—Ready For Immediate Shipment



YOU GET TO THE MEAT OF HARD-TO-CRACK BLAST CLEANING PROBLEMS FASTER WITH

HI-GRADE SHOT AND GRIT

- **YOU GET MORE EFFICIENT PEENING AND CLEANING.** Hi-Grade Shot and Grit is uniform, especially processed to withstand repeated strain, stress and wear.
- **YOU GET MORE FOR YOUR BLAST CLEANING DOLLAR—LESS WASTE.** Hi-Grade Shot is famous for its lack of hollows, tails and irregular shapes which do no good, yet cost money. Hi-Grade Grit is free from dust fines and scale. This alone, saves you up to 20% in actual cost *before you even use Hi-Grade Shot and Grit.*
- **YOU GET A LOWERED COST PER TON OF CASTINGS CLEANED** because Hi-Grade Shot and Grit has a longer re-use value. Special alloying and tempering process minimizes impact fractures.

HI-GRADE SHOT AND GRIT MORE THAN MEETS S.A.E. SPECIFICATIONS—SCREENED AND GRADED FOR 100% USAGE

Clayton-Sherman *Abrasives Company*

MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

Representatives in Principal Cities

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These Metalworking Methods Save Time and Money

These six methods for keeping production geared to current demands are typical of the many processes and products available through LINDE. Not shown, but equally available to LINDE customers, is the invaluable combination of knowledge, technical skills, and wide practical experience that makes such developments possible.

Whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, quicker, or cheaper. Telephone or write our nearest office today.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
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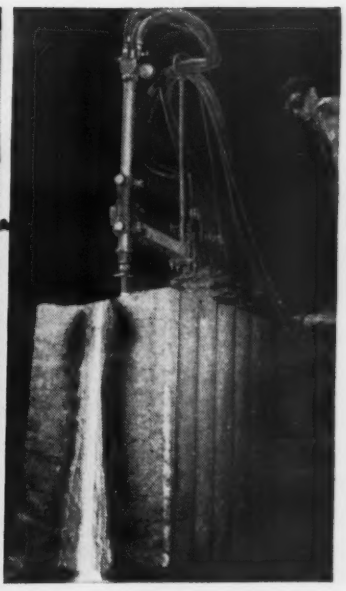
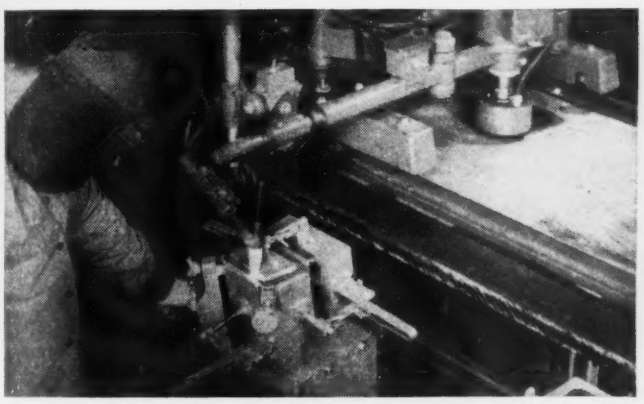
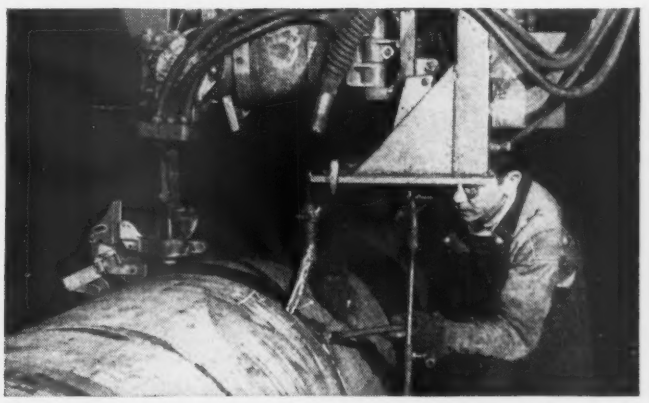
Offices in Other Principal Cities
In Canada: Dominion Oxygen Company, Limited, Toronto



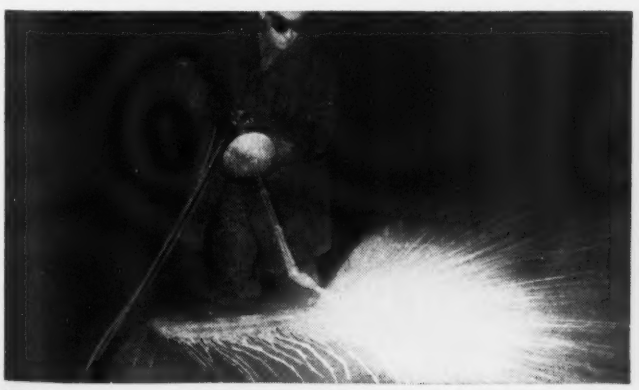
(Left) Flame-hardening gives added service life to parts by providing a hard, wear-resisting surface on a tough, ductile core. (Right) Oxygen-cutting equipment easily slices steel up to 60 in. thick. A 30-in. cut through this 45-in. thick ingot took only 15 minutes.



HELIARC welding in a protective shield of argon or helium gas easily joins hard-to-weld metals such as aluminum, magnesium, stainless steel, and copper alloys. Absence of flux and spatter reduces cleanup and finishing costs.



UNIONMELT welding, a mechanized electric process, joins metals of any thickness without sparks, spatter, smoke, or flash. Welding speeds as much as twenty times greater than by other similarly applicable methods are common.



Powder-scarfing halves conditioning costs on stainless steel. One 8-hr. shift, using two blowpipes, easily powder-scarfs 22 to 24 ingots of 1,000 lb. each.

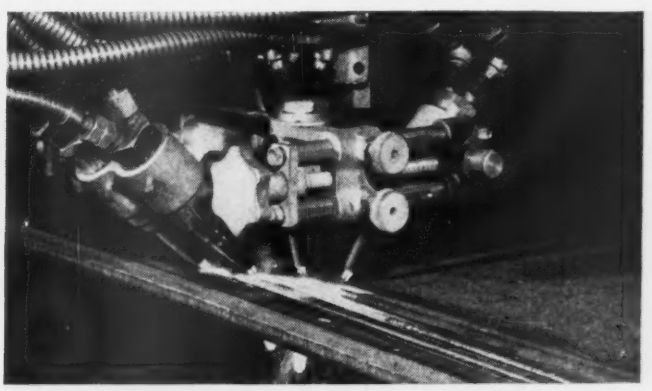


Plate-edge preparation with OXWELD apparatus makes it possible to cut steel plate to size and bevel the edges for welding in one, quick, oxygen-cutting operation.

Linde
Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The terms "Heliarc," "Linde," "Oxweld," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation

STERLING'S "FOUR POINT

HELPS PRODUCE BETTER FA

THE STERLING GRINDING

PRODUCTION CONTROL"

FASTER FOUNDRY GRINDING

Test these superior "Wheels of Industry" on your own machines . . . prove to your satisfaction the faster production you can steadily maintain with them.

STERLING'S "Four-Point Production Control"—through ENGINEERING, COMMITTEE, LABORATORY, and MANUFACTURING—means better grinding wheels for all types of foundry jobs.

Sterling's ENGINEERING determines, right on the job, what is the correct abrasive unit to solve your particular problem. COMMITTEE control gathers together Sterling grinding experts for careful checkup of your needs before recommendations are made. LABORATORY control takes these recommendations and builds them into the correct wheel formula. Then and only then, does MANUFACTURING, carefully controlled, take over to produce what has been given a triple checkup. No wonder Sterling Grinding Wheels do such efficient jobs of swing frame, stand and portable work! They are tailor-made for every assignment!

Foundrymen have learned through experience to specify Sterling Grinding Wheels because our specification-duplication means identical, better results wherever these abrasive units are used.

In your grinding departments, Sterling's "Wheels of Industry" can produce startling results. Our engineers are ready to explain how easily it can be accomplished.

BEST IN THE TEST—THAT'S STERLING!

• **During a recent test of Sterling High Speed Snagging Wheels, size 24 x 3 x 12, the department foreman reported them the best grinding wheels they had ever used on miscellaneous alloy steel castings. Comparison proved the Sterling Wheels were freer cutting and provided 12% more life than other brands tested! Think of it — six hours of extra efficiency from the Sterling "Wheels of Industry" at no extra cost!**

These results are typical and indicate the ease with which you can solve your problems with Sterling Grinding Wheels.

Ask for These STERLING Research and Development Folders - - -

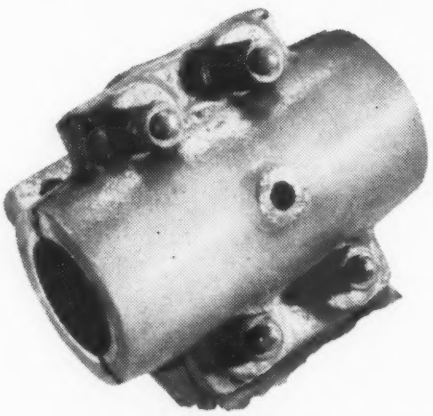
When sudden decisions must be made regarding proper grinding wheels to use, you will find these folders handy to have in a nearby file. You will appreciate having the interesting data to study while waiting for the Sterling engineer's call. Especially important is the popular book, "The Art and Science of Grinding," now in its fifth edition. There is no obligation . . . just send your name and address and your folders will be mailed at once.

WHEEL DIVISION TIFFIN OHIO

GRINDING WHEEL INSTITUTE MEMBER

Why *Brass* can better serve your needs

Time Tested Durability



YEARS OF CONTINUOUS USE WITH NO SIGN OF BREAKDOWN . . .

Years of human experience is adequate testimony that Copper Alloys effectively resist the destructive forces of time. Throughout the ages and especially today, Brass and Bronze Alloys coupled with skilful craftsmanship . . . consistently prove themselves best for applications involving continual use, constant strain and exposure to the elements. The Casting shown is a testimony of this fact.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 8, No. 1 — containing an article discussing "Effects of Various Elements in Manganese Bronze."

Specify—LAVIN NONFERROUS INGOT—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

R. LAVIN & SONS, INC.

- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

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REPRESENTATIVES IN PRINCIPAL CITIES

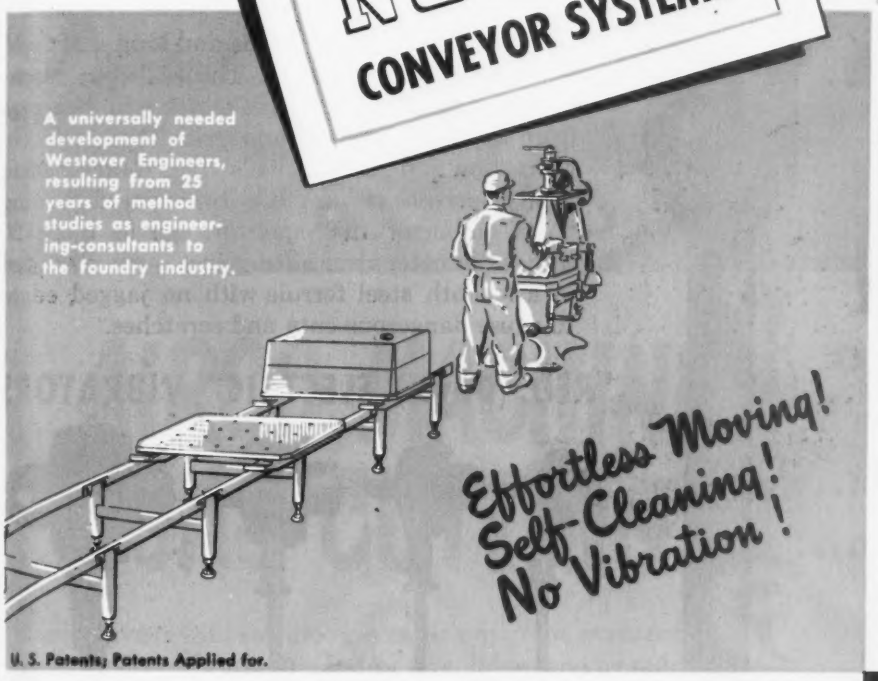
R. LAVIN & SONS, INC. 1900 52 Years 1952 SERVING THE FOUNDRY INDUSTRY

WESTOVER ENGINEERS

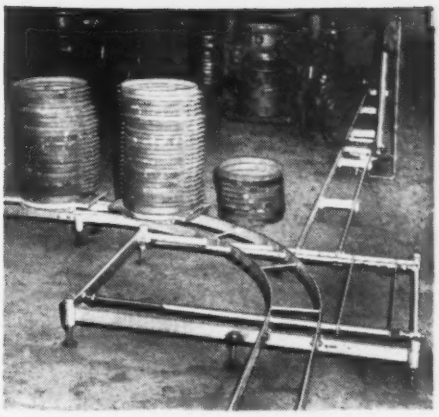
OFFER THE

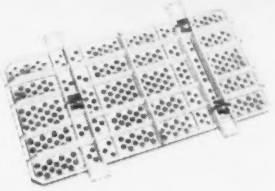
Revolutionary

NOMAD CONVEYOR SYSTEMS


A universally needed development of Westover Engineers, resulting from 25 years of method studies as engineering-consultants to the foundry industry.
Effortless Moving!
Self-Cleaning!
No Vibration!

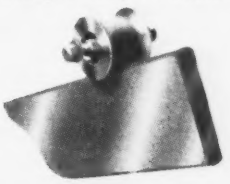
U. S. Patents; Patents Applied for.





RIGID ALUMINUM BOTTOM BOARD

Deep seated bottom board rollers, shielded from sand and molten metal, eliminate vibration and sudden shifts often caused by sticking conveyor rollers.



BOTTOM BOARD ROLLER ON RAIL

Special rounded rail edge is automatically cleaned by smooth passage of non-lubricated ball bearing rollers. Bar construction eliminates horizontal dirt collecting surfaces.

Nomad flexibility brings new efficiency to any foundry layout!

This entirely new foundry conveyor system is "based on a principle as logical as mounting a boxcar on wheels." Basically as simple as that, its flexibility permits easy adaptation to any foundry layout. Numerous specially engineered NOMAD systems have been installed involving the use of curves, switches, transfer cars, and sloped sections. Whatever the space and mobility problem, NOMAD conveyor facilities can be assembled in a wide variety of combinations to bring new and profit-making foundry efficiency.

NOMAD Foundry Equipment engineers are available to assist in laying out the equipment for you to make the most efficient use of your facilities . . . to bring to your operation increased production through reduction in lost molds, lower maintenance costs and an overall substantial saving in time and manpower.

THESE ARE NOMAD'S REVOLUTIONARY FEATURES:

1. **No Vibration during Travel:** Bottom board location of rollers and smooth, level track, guarantee against vibration.
2. **Effortless Moving:** Twin rows of ball bearings in the rollers permit moving with minimum friction.
3. **Self Cleaning:** Entire assembly is constructed to shed sand accumulation. Top rail is self-cleaning.
4. **Low Maintenance Cost:** Non-lubricating bearing eliminates greasing and oiling. Cleaning time minimized by self-cleaning open construction.
5. **Low Initial Cost:** Case histories show offset of initial cost in only three months.

See a demonstration of NOMAD Conveyors at Atlantic City . . . in both the Westover and Newaygo Booths.

NOMAD FOUNDRY EQUIPMENT

Manufactured by

WESTOVER ENGINEERS

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JOHN B. SKELLY

232 HOME AVENUE • OAK PARK, ILLINOIS

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NEWAYGO ENGINEERING COMPANY

NEWAYGO, MICHIGAN

YOU'LL DO A BETTER JOB

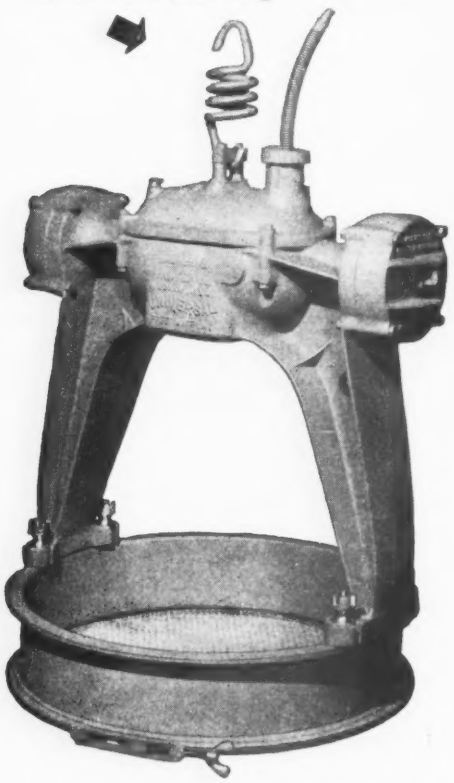
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

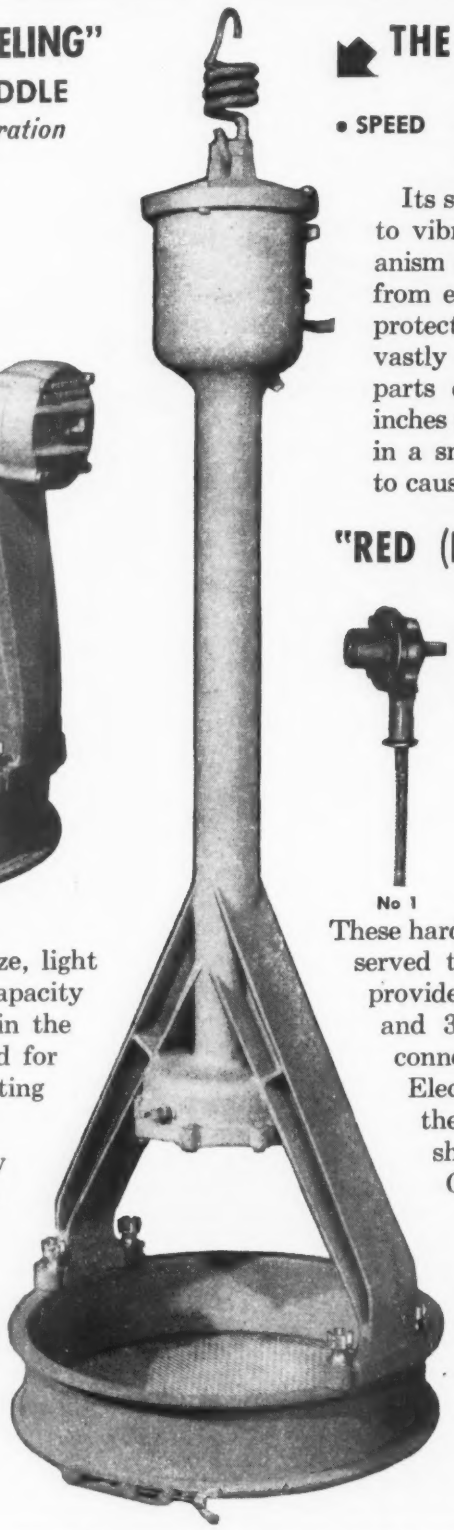


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



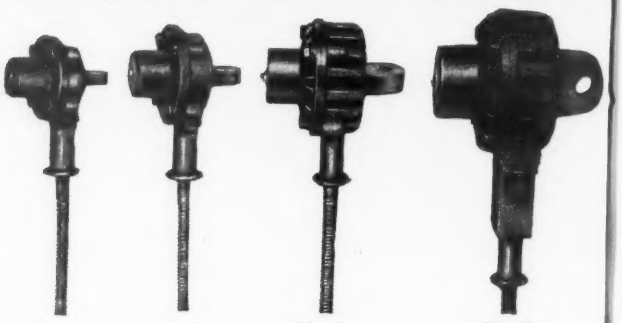
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 **No. 2** **No. 5** **No. 9**

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

AIRCO MACHINE GAS CUTTING

...speeds riser removal
...minimizes grinding
...increases accuracy
...reduces operator fatigue

Cutting risers with an Airco gas cutting machine saves time, greatly decreases grinding and/or machining—and by reducing operator fatigue, it increases and speeds-up production.

Here, for example, is illustrated a simple machine set-up that permits fast, accurate riser cutting. Using an Airco Radiagraph, the casting — measuring 105″ in diameter and 5″ in thickness — is trimmed at a speed of 5″ per minute. More important, the Radiagraph cuts so close to final machining specifications that slow expensive machine work or grinding is eliminated, and a costly production bottleneck is done away with.

This actual case history demonstrates the advantages of removing gates and risers by machine gas cutting. Airco gas cutting machines are easily adaptable to any cutting requirements — straight line, circle, or bevel-edge cuts.

If you would like further details on how machine gas cutting, as well as other Airco oxyacetylene processes can save time and money for your foundry operation, call or write your nearest Airco office — today.

Top photograph shows the simple set-up that makes easy work of a tough job. Above you see the clean, accurate cut, ready for machining.

AIRCO

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY
AIR REDUCTION PACIFIC COMPANY
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
Divisions of Air Reduction Company, Incorporated
Offices in Principal Cities

INTERNATIONAL FOUNDRY CONGRESS
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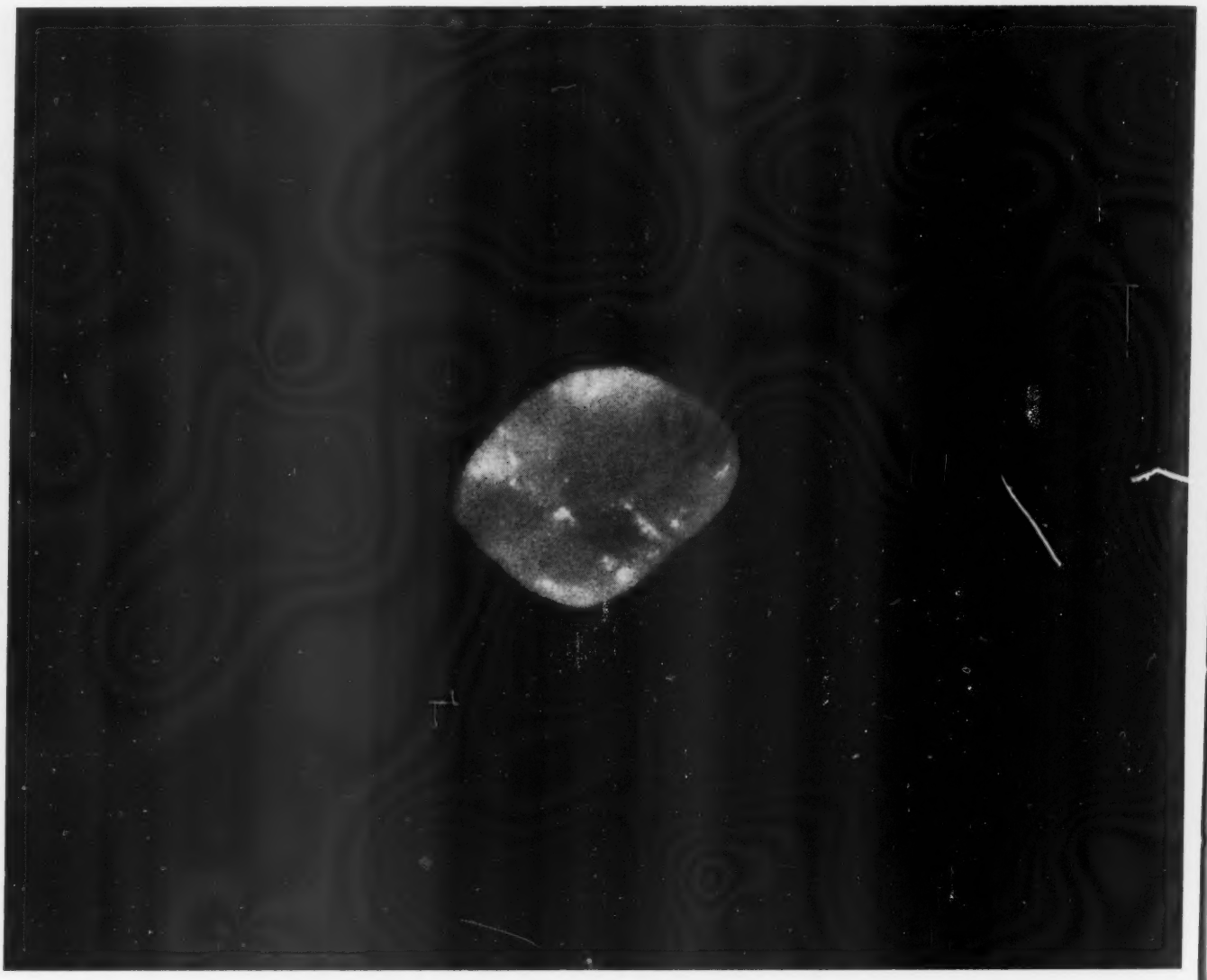
MAY 1—7, 1952
VISIT OUR BOOTHS 334-336



Close-up of $62,801.85

This is not an uncut diamond, but it does have value. It is a magnified grain of used and reclaimed foundry sand. $62,801.85 is the actual saving experienced in one year by a foundry using a Nichols Sand Reclamation System. Are you interested in saving money, too? Ask for bulletin No. 222.

Write to:

Nichols Engineering & Research Corp.

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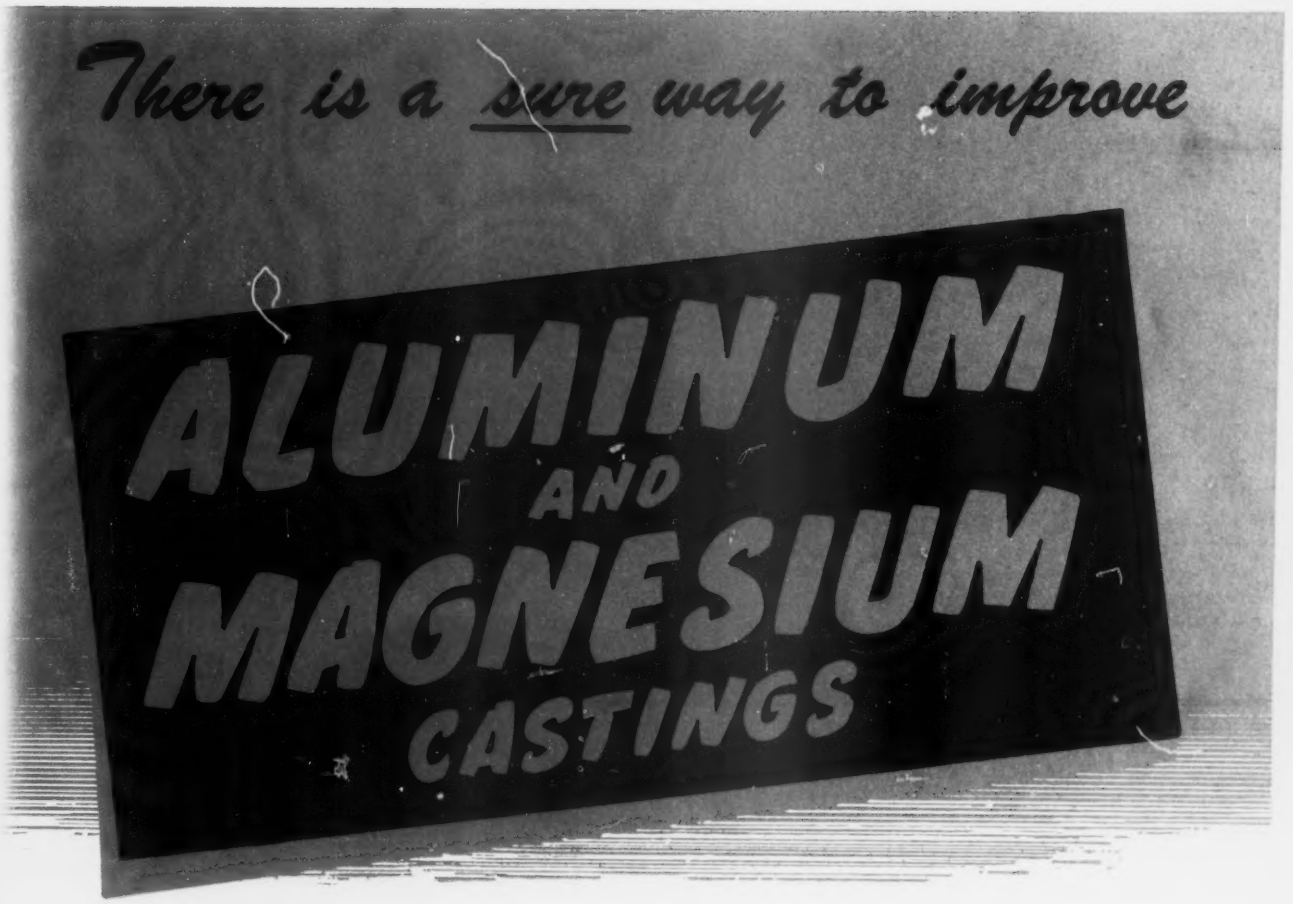
1920 N. Meridian St., Indianapolis 2, Ind.
40 S. Los Robles Ave., Pasadena 1, Calif.
1477 Sherbrooke St., W., Montreal 25, Canada

Nichols

Sand Reclamation Systems



AQUA-SET

Cores made with Aqua-set have produced some of the finest castings ever poured in Aluminum and Magnesium. Aircraft castings that require strength, dimensional accuracy, and perpetual uniformity have been made with the help of Aqua-set for years on end, and now in other fields, it is proving a first aid in dealing with problem castings. Nothing will bake faster or leave castings cleaner at the shake-out. Aqua-set can be the most useful tool in your core room. Write us for a full description.

UNILEASE

and now Unilease makes its bow as a top quality release agent and Liquid Parting. Sand mixes that tend to stick in the core box can be brought to a clean working condition by adding only a small amount of Unilease. Good results can be had if one part of Unilease "98" is mixed with two parts of kerosene and as little as 1/2% is added last in mixing. It fills a real need with resin binders. Sand and core boxes are kept clean and it leaves a beautiful shine on the blades of the sand mixer. Unilease is worth a trial order. You get a real release with Unilease.

UNITED OIL MFG. COMPANY

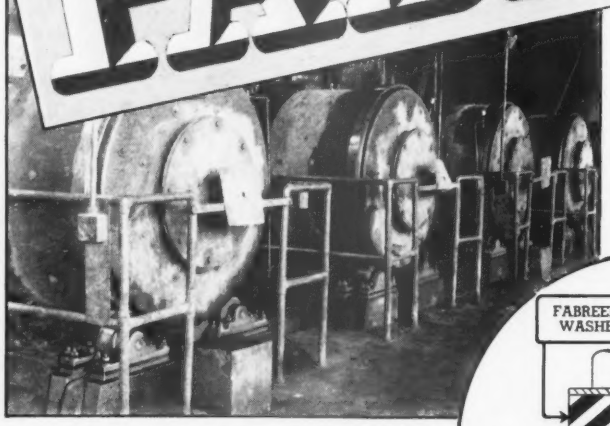
1492 WALNUT STREET, ERIE, PA.

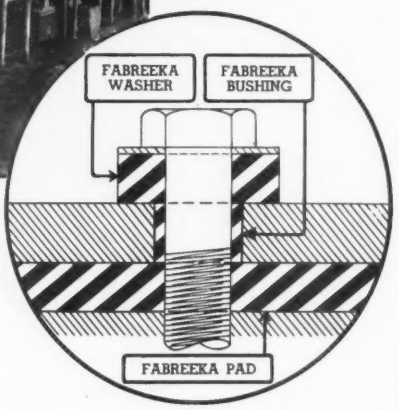
Under All Heavy Machinery

FABREEKA

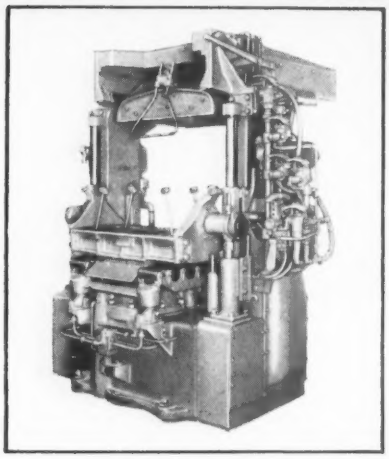
PADS, BUSHINGS, and WASHERS

Absorb Impact Shock and Reduce the Effect of Destructive Vibration



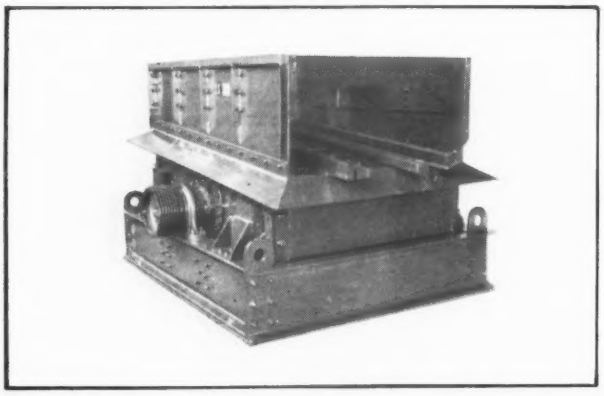


SHOWN AT LEFT
CROSS SECTION OF
FABREEKA INSTALLATION



FABREEKA Pads, bushings, and washers are installed under Shakeout Machines, Jolt Moulders, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production. In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.

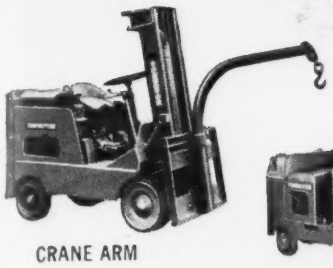


Write for latest literature

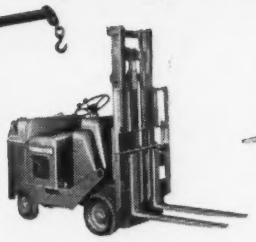
It Pays To Specify Fabreeka

FABREEKA PRODUCTS COMPANY, INCORPORATED
222B Summer Street
Boston 10, Mass.

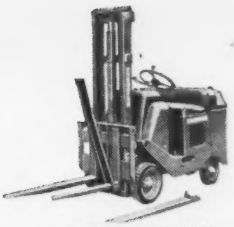
for IMPACT SHOCK and VIBRATION



CRANE ARM

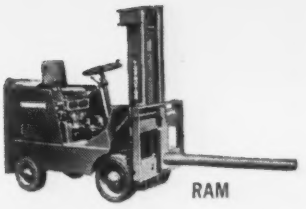


EXTENSION BACK REST

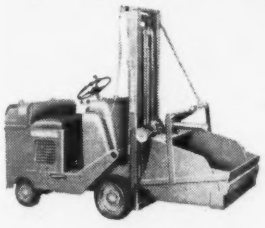


FORK EXTENSION

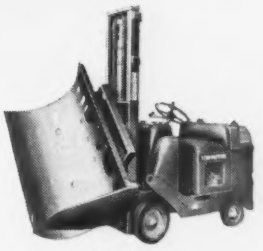
OVERHEAD GUARD



RAM



SCOOP

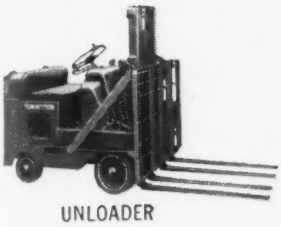


UPENDER

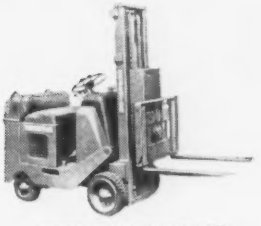
Regardless of your Material Handling Problem–

WE'LL BET ONE OF THESE TOWMOTOR ACCESSORIES

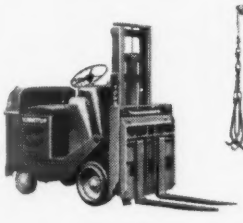
*can help solve it!**



UNLOADER

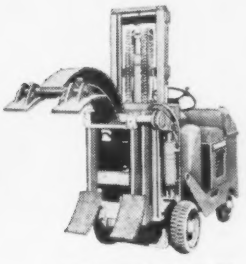


REVOLVING CARRIAGE

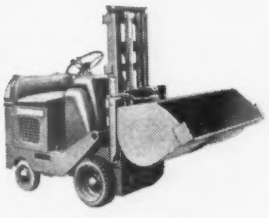


SIDE SHIFTER

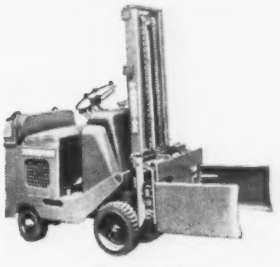
COTTON TRUCK



ROLL GRIP-UPENDER



HYDRAULIC SCOOP



BALE CLAMP

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HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT **AMERICANISM** TODAY?

operating costs

Cut ½

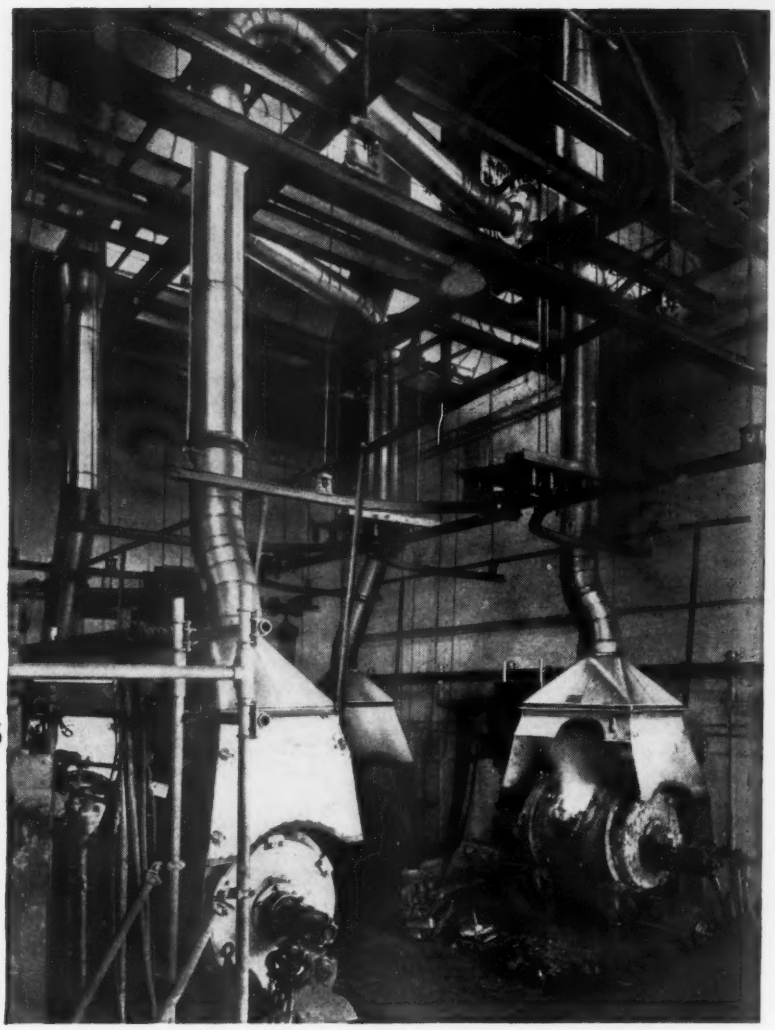
. . . FUME CONTROL SYSTEMS

by KIRK AND BLUM

At The William Powell Company
Cincinnati Valve Manufacturers

•

Twelve electric furnaces in the non-ferrous foundry of this noted valve manufacturer are individually exhausted by just six fans. Fan-driven exhaust from one hood is injected into a venturi in the piping from another hood.

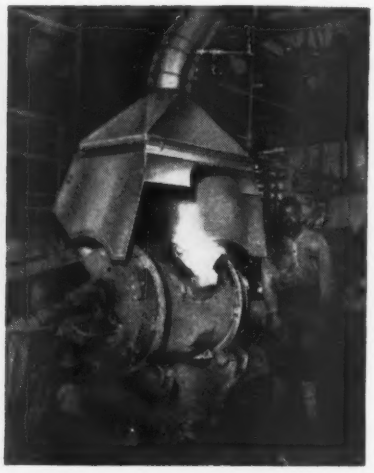


In metals melting operations, uncontrolled smoke, fumes and gases are a toxic nuisance. At The William Powell Company, "Clean Air . . . the Invisible Tool," as applied by KIRK & BLUM Engineers, controls this condition.

In addition, KIRK & BLUM Engineers, by utilizing the injector principle reduced initial cost, operating costs and halved maintenance—since each fan provides individual exhaust for two furnaces.

Although a "home-grown" system may be low in first cost, its savings fade when compared to the efficiency, lower maintenance and operating costs of a correctly designed, fabricated and installed system. Put your dust or fume problems up to experts . . . The Kirk & Blum Mfg. Company.

System OFF



. . . and System ON

THE KIRK & BLUM MFG. CO.
3108 Forrer Street Cincinnati 9, Ohio

FUME CONTROL SYSTEMS

Never Before!!

...SO MUCH POWER PER POUND

MEET the new Rotor Vertical Air Grinders! Never before have you had so much power in vertical air grinders...for such light weight! They're well balanced . . . easy on the operator. Here are *new* features to speed up your metal removal.

THE NEW B-35

Weight	10¾ lbs.
Height	7½ inches
Spindle	⅝" - 11"
6000 - 5500 - 4500 - 3500 RPM	

THE NEW B-12

Weight	10 lbs.
Height	7 inches
Spindle	⅝" - 11"
6000 - 5500 - 4500 - 3500 RPM	

For cup wheels, sanding pads, cut-off wheels, wire brushing.

AIR O'TOOL

WRITE TODAY FOR BULLETIN No. 40.

THE ROTOR TOOL CO.
CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

ARE YOU A *Betting Man?*

We would like to bet you a good lunch—that you can't take five pellets of the chilled iron shot you are now using and deform them, no matter how lightly you tap with your hammer. ALL OF THEM WILL SHATTER—NONE OF THEM WILL DEFORM.

Then we'd like to bet you another lunch that you can take five pellets of National Controlled "T" Shot and EVERY ONE OF THEM WILL DEFORM BEFORE TEARING APART.

The significance of these statements is obvious. National Controlled "T" Shot and Grit is the ONLY chilled iron abrasive in which the hard iron carbides (that do the cutting) are imbedded in a *ductile matrix*. Hard? Yes, indeed, hard enough to do a cleaning job as fast or faster, BUT soft enough to go easy on your equipment and to keep the shot from shattering as readily.

As a betting man, we'd like to prove our statements to you. The most you can lose is a lunch. And if we're telling the truth, you can gain substantial savings in your cleaning operations. What we suggest is such a quick and simple test, you can make it in a matter of minutes. Incidentally, if your blastcleaning operation requires the use of grit you will not be able to make this test—but remember, grit is made from shot, and a ductile matrix is even more important to a grit user, from a standpoint of holding down maintenance costs. Please write your name and address on the coupon below and mail it to the nearest Hickman-Williams office, and let us show you something *different* in chilled iron shot and grit.

NATIONAL CONTROLLED "T" SHOT AND GRIT *IS PRODUCED EXCLUSIVELY BY*
NATIONAL METAL ABRASIVE COMPANY • CLEVELAND, OHIO
WESTERN METAL ABRASIVES COMPANY • CHICAGO HEIGHTS, ILL.
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INDIANAPOLIS

OK. Let's see you prove your point...

Name_____

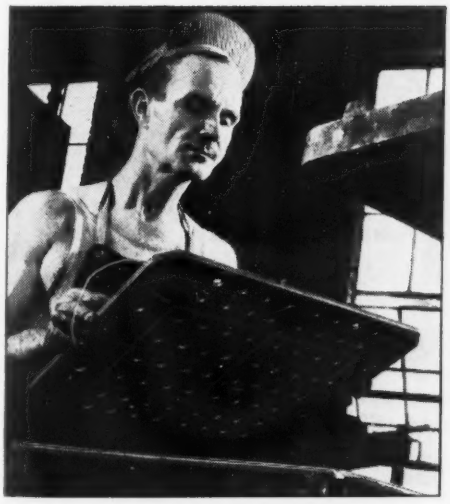
Firm_____

Address_____

City_____

MAIL TO HICKMAN, WILLIAMS OFFICE NEAREST YOU

"EDCO BOTTOM BOARDS eliminate swelled castings"



Above photo shows Mid-City Foundry Company molder placing EDCO DOWMETAL Bottom Board on flask preparatory to pressing. Mid-City Foundry produces high quality gray iron and alloy castings.

Take a tip from E. F. Dublinski. He speaks from experience in saying —"EDCO DOWMETAL Bottom Boards eliminate swelled castings". Since switching to magnesium boards, Mid-City Foundry does not have castings ruined through swelling caused by depressions burned into out-dated wood boards.

EDCO DOWMETAL Bottom Boards help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"We consider EDCO DOWMETAL Bottom Boards as permanent equipment at Mid-City," adds E. F. Dublinski, "because they'll outlast wooden boards at least 30 to 1 and in no time at all pay for themselves."

Your molders will like handling these boards because they are light in weight, easy to stack, and there's no danger of splinters. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.

CHRISTIANSEN CORPORATION

1517 N. KILPATRICK AVENUE • CHICAGO 51, ILLINOIS

Aluminum Alloy Ingots • Zinc Base Casting Alloys

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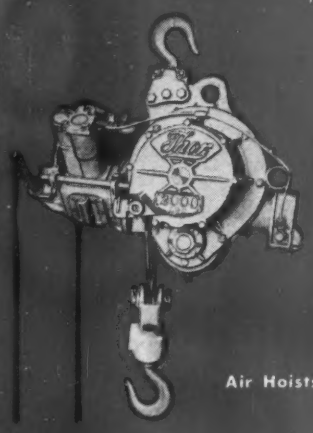
AIR and FOR EVERY



Air Hoists

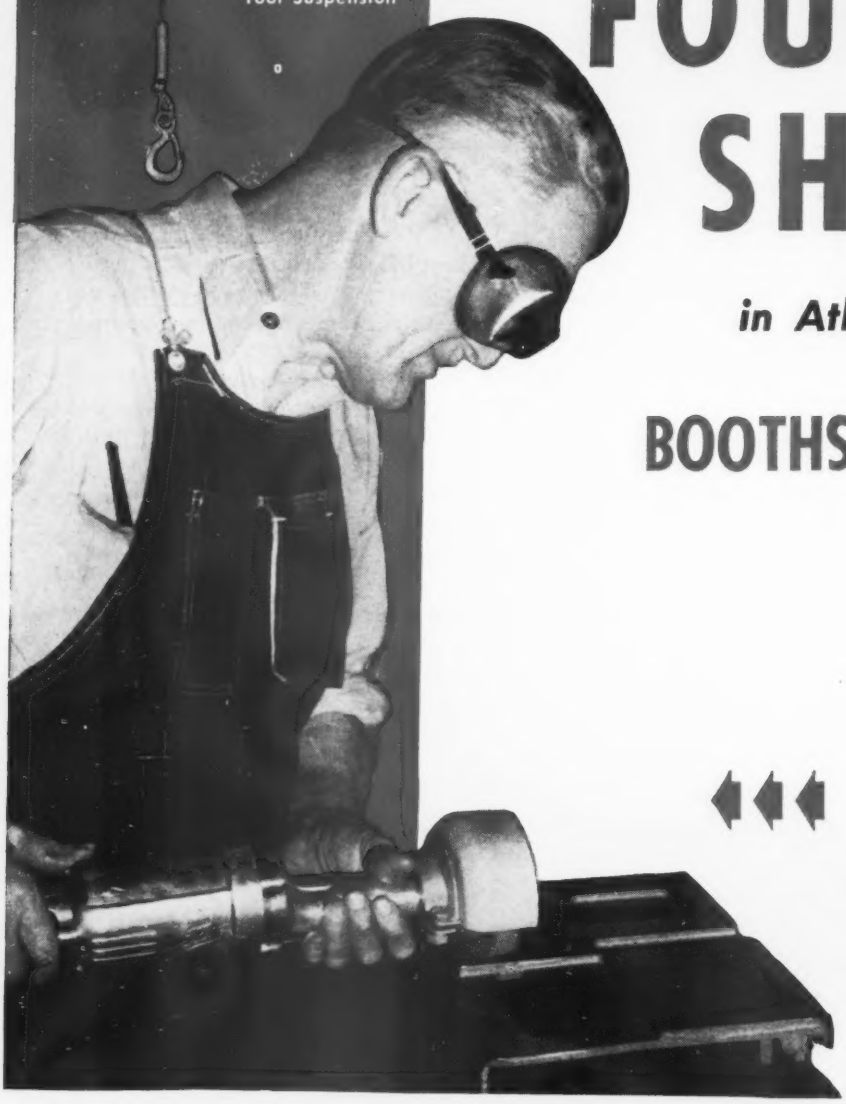
Balancers for Tool Suspension

SEE THEM AT THE

FOUNDRY SHOW

in Atlantic City

BOOTHS 1201-1203



MOST MODERN OF ALL THOR TOOLS, new 360-cycle high frequency electric grinders, sanders, drills will be featured at the Atlantic City Foundry Show, Booths 1201-1203, along with a wide selection of other electric and pneumatic tools. At left, new Thor "37" class 360 cycle grinder gets foundry job done faster . . . better . . . and at lower unit cost.

ELECTRIC TOOLS
FOUNDRY APPLICATION

Find Out WHY Thor Tools Are First Choice in Foundries!

THOR WORKS with foundry people to build them *what they want*—

360 cycle electric tools
180 cycle electric tools
60 cycle universal electrics
AIR TOOLS in every conceivable style and capacity from tiny die grinders to 3-ton hoists.

EVERY THOR TOOL in every class and type has special features of performance, enduring dependability and handling ease that DEMONSTRATIONS and TRIALS prove beyond the shadow of a doubt. This statement can be proved to your satisfaction either at the Foundry Show or in your shop — write Independent Pneumatic Tool Co., Aurora, Ill., or any of Thor's factory branch offices in 20 principal cities.

Thor PORTABLE POWER TOOLS

The increased e
is a

CASTFLUX

Trade Mark Reg.

Th N
D
P
F

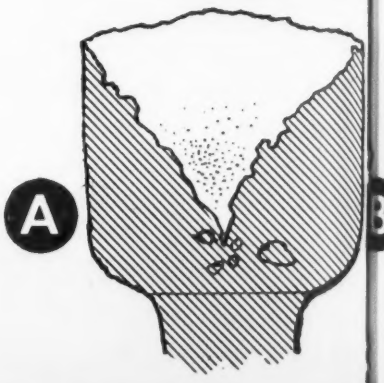
We'll be seeing all our old and many new FRIENDS
May 1st-7th
INTERNATIONAL FOUNDRY CONGRESS & SHOW
Atlantic City, New Jersey
BOOTH #214

CASTFLUX SB-10 is a dual purpose flux, a partly exothermic compound, for feeding heads and risers, that virtually does not smoke or create fume. There is absolutely no carbon pick-up at the neck of riser or casting itself. As a ladle addition it is a wonderful liquidizer — through its cleansing action it de-oxidizes and de-gasifies the metal.

unconditionally GUARANTEED

Place a trial order for CASTFLUX SB-10—you risk no money! Unless it meets with your full approval, material can be returned at no expense within 30 days.

Send for free literature—
"The Story of CASTFLUX"



CASTFLUX **NATIONAL pigment** C 21

eiency of new CASTFLUX SB-10
ailable at no extra cost— secure high average in maximum pipe elimination in both iron and steel risers and hot tops—

'h National'

DUAL-PURPOSE FLUX

CASTFLUX SB-10, the anti-piping compound, proven so revolutionary in its advantages, has become standard usage in foundries and steel mills the world over in securing the highest average result in maximum pipe elimination.

Now you can pour risers short . . save on re-melting cost with less fuss and bother . . secure more, sound, and shrinkage-free castings, regularly. Usually it requires only 50% to 65% of CASTFLUX SB-10 to do the job better with greater results.

CASTFLUX SB-10 is stocked by the following distributors in your market:—

Seattle, Washington
WESTERN FOUNDRY SAND CO.

Portland, Oregon
WESTERN INDUSTRIAL CO.

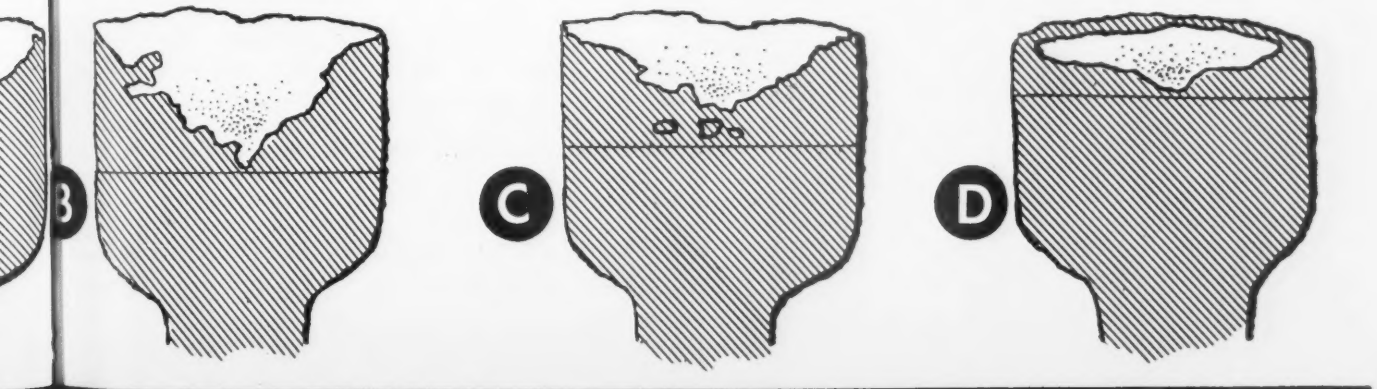
Los Angeles, California
SNYDER FOUNDRY & SUPPLY CO.

Detroit, Michigan
NATIONAL FOUNDRY SAND CO.

Dayton, Ohio
THE FENTON FOUNDRY SUPPLY CO.

Elmira, New York
F. F. SHORTSLEEVE CO.

Which type A - B - C - D is the average result in your foundry? Switch to CASTFLUX SB-10 and get more of the B - C - D type!



CO 2115 East York St., Philadelphia 25, Pa.

CASTFLUX

NEW . . .
IMPROVED

HEAVY DUTY

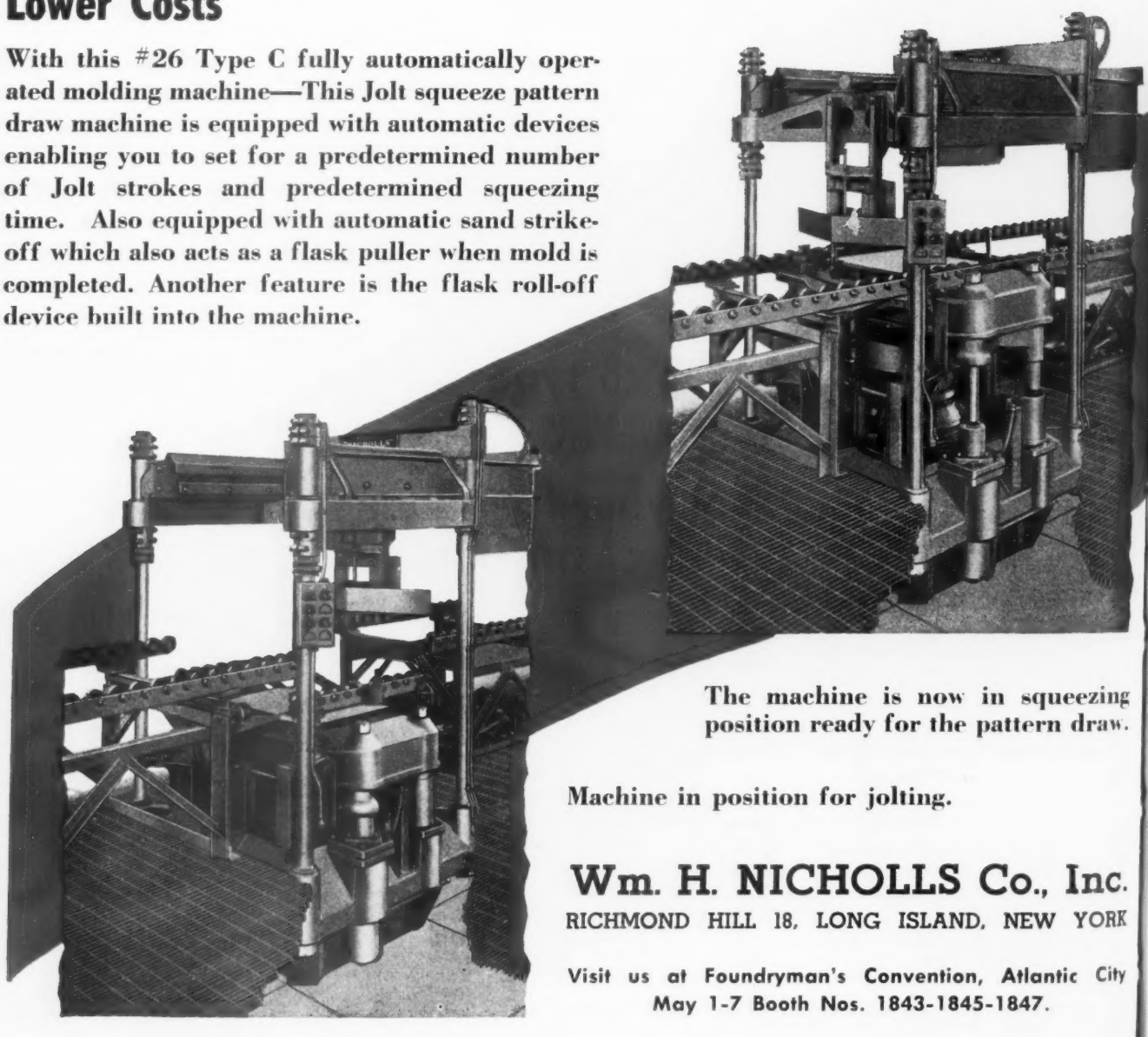
JOLT—SQUEEZE—

Equipped with "Safety"

for fully automatic

Increase Production . . .
Lower Costs

With this #26 Type C fully automatically operated molding machine—This Jolt squeeze pattern draw machine is equipped with automatic devices enabling you to set for a predetermined number of Jolt strokes and predetermined squeezing time. Also equipped with automatic sand strike-off which also acts as a flask puller when mold is completed. Another feature is the flask roll-off device built into the machine.



The machine is now in squeezing position ready for the pattern draw.

Machine in position for jolting.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

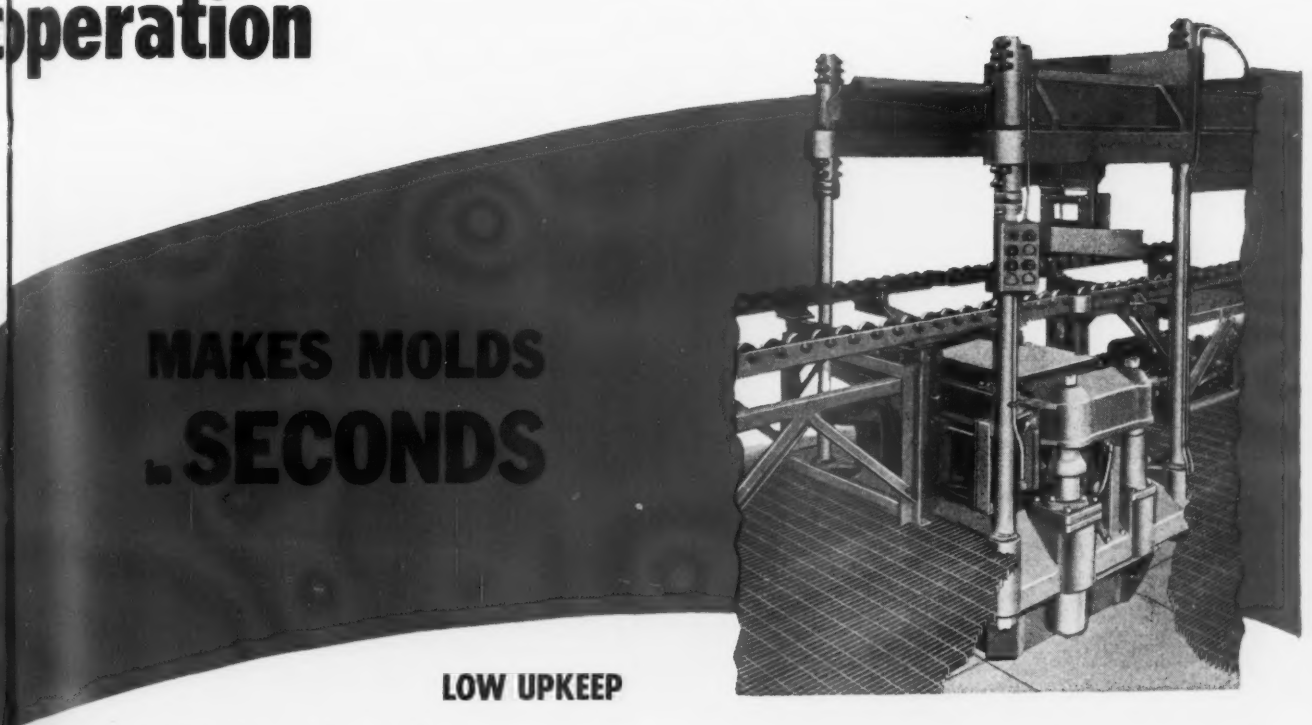
Visit us at Foundryman's Convention, Atlantic City May 1-7 Booth Nos. 1843-1845-1847.

YMOLDING MACHINES

—and PATTERN DRAW

y" Push-Button Controls

tioperation



LOW UPKEEP

All draw pins and guide bushings are case hardened and ground to precision tolerances for perfect fit and smooth operation. An accurate system of gages and jigs provides interchangeability of parts for the same models.

The low upkeep records of hundreds of foundries attest for foresight of Nicholls' Engineers in designing inbuilt features that make for long life and accurate, dependable performance after years of service. As an instance, we point to the dirtproof housings and forced lubrication that are provided for all critical parts that might otherwise wear quickly and affect permanent alignment and satisfactory operation.

The international acceptance of large numbers of Nicholls' molding machines for many years is evidence of their productive capacity, combined with low upkeep and reliability.

Write for Literature

The pattern has been drawn, the pressure head returns to the out position and automatically pulls the finished mold onto the roller extension.

GUARANTEED WORKMANSHIP

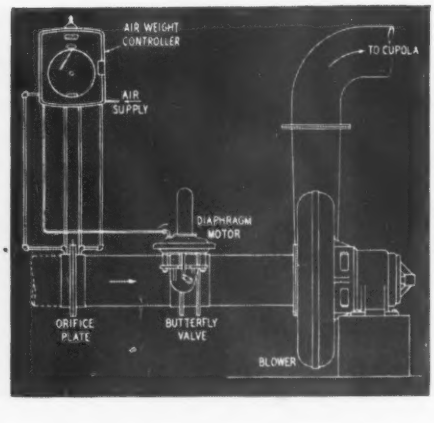
Wm. H. Nicholls Co. BUILT BY NICHOLLS

Smooth sensitive operation is built into all moving parts of Nicholls molding machines by expert mechanics, skilled in their specialized tasks. Close tolerances assured by a system of accurate jigs and fixtures.

NICHOLLS

SHORT CUTS to foundry cost reduction

New Model 40
Air-weight Controller
— designed for today's higher operating pressures, increased production rates, mechanical charging, and variable material sizes.



Save Pigging – Save Fuel – Save Rejects with FOXBORO AIR WEIGHT CONTROL

Here's a simple way to effect important savings in cupola operation. The Foxboro Air Weight Controller accurately controls the blast by *weight* of air . . . supplies precisely the correct amount of oxygen for the coke charge. It automatically compensates for variations in atmospheric temperature and pressure . . . makes every day a good pouring day! That means better combustion, more uniform heats and uniformly better castings. And you save the time and fuel wastes of needless pigging. Over 1300 cupolas are now equipped with Foxboro Air Weight Controllers.

EXHIBITED AT THE FOUNDRY SHOW

Stop cupola troubles before they start, with the FOXBORO WINDBOX PRESSURE RECORDER

Continuous pressure records provided by this instrument enable operators to keep tabs on cupola conditions. They immediately reveal any blast restrictions, such as clogged tuyeres or bridging over of the charge . . . save production losses by permitting prompt correction of the trouble. Proven in hundreds of foundries, simple sturdy Foxboro Windbox Pressure Recorder can help cut costs on any cupola.

Keep dew point constant in blast air, with the FOXBORO BLAST HUMIDITY RECORDER OR CONTROLLER

A Foxboro Dewcel*, in conjunction with a Dynalog Recorder, makes a continuous, accurate record of the blast air dew point. With a Controller, either a constant high moisture content can be maintained very simply (by control of steam or water spray), or dehumidifying equipment can be controlled to maintain constant low dew point. Simple to install, dependable in operation, moderate in cost. Foxboro's unique Dewcel is used with Dynalog Recorder illustrated at right.

*Trade-Mark

FOXBORO
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INSTRUMENTS

FACTORIES IN THE UNITED STATES, CANADA AND ENGLAND

OTHER FOXBORO INSTRUMENTS FOR THE FOUNDRY INCLUDE EQUIPMENT FOR CONTROL OF:

Core oven temperatures — Sand dryer temperatures — Plant air system pressures — Annealing and normalizing temperatures — Plating and cleaning bath temperatures — Non-ferrous pouring ladle temperatures. Write the **Foxboro Company, 325 Neponset Ave., Foxboro, Mass., U.S.A.**

for casting
ALUMINUM BRONZE
MANGANESE BRONZE
SILICON BRONZE

FOSECO
ALBRAL
TREATMENT

efficient—simple operation
produces better castings
at lower cost

Rejected castings are costly in time, money and effort. Sound castings mean sound business for you. FOSECO ALBRAL added to Aluminum, Manganese and Silicon Bronzes will help you obtain perfect results from these normally difficult casting alloys.

PREVENTS FORMATION OF OXIDES
ALBRAL reduces melting losses, keeps crucibles and furnaces clean.

DOES NOT AFFECT COMPOSITION
ALBRAL removes oxides only, does not change alloy content.

DISSOLVES OXIDES AND NON-METALLICS
ALBRAL increases fluidity, prevents misruns, eliminates inclusions.

PREVENTS ABSORPTION OF GASES
ALBRAL improves mechanical properties and increases pressure tightness.

TRY FOSECO ALBRAL AT OUR RISK!

You be the judge. Order a 50 pound trial of FOSECO ALBRAL today. Use it in your own foundry. If not completely satisfied with the results, tell us—and we will cancel the invoice. You can't lose—so order today!

FOUNDRY SERVICES, Inc.
280 Madison Ave., Dept. F
New York 16, N. Y.

Readers' COMMENT

Cupola vs. Electric Furnace

TO THE EDITORS:

In the February issue of FOUNDRY, in the "Question and Answer" section, there was a brief discussion (in response to a question) concerning the comparative costs of electric furnace and cupola melting. I believe that the limitation of space in answering such questions may have led to some confusion in regard to the true picture concerning comparative costs. I think it would prove interesting for parties desiring fuller information to read the entire article you referred to. This was in the February, 1949 issue by A. W. Gregg, and it would probably give them a clearer picture of the comparable costs.

On reading the entire article it would develop that in many instances electric furnaces can, and do, produce metal cheaper than the cupola.

It should also be mentioned in comparing the cost of electric melting vs. cupola melting, that the proper comparison should be made on the basis of cost of metal in good castings, rather than what might be actually termed just "melting costs." Ordinarily, if one merely compares the cost of coke plus wind in the case of the cupola, with the cost of electric power plus electrodes in the electric furnace, it presents a rather unfavorable picture for the electric furnace, if the comparison stops at that point. On this basis, almost without fail, the cupola appears to be the cheapest melting means.

On the other hand, the proper comparison should be made on the basis of metal in good castings. On that basis it would be found that the electric furnace can and does compare favorably with the cupola, and in numerous cases shows lower melting costs.

There are several reasons for this. First is the fact that the electric furnace can be operated on cheaper and lower grade charges than is the case with the cupola. Second, with the electric furnace a much better yield of good finished castings results. This is due to the fact that one has constant control over both temperature and analysis. There are fewer mis-runs and defective castings. The castings are of the desired analysis, and in addition, the electric furnace offers the conveniences of having an available reservoir space for return of metal in case of delays on the foundry floor. There is no need to pig the metal and remelt it, as is the case with the cupola.

While the cupola has been a tried and proven piece of melting equipment, it does have definite limitations, and in general one does not have too close control over analysis and temperature. Once the charge is placed in the cupola the operator is obliged to accept just about what comes out. If a change in analysis is desired it is most difficult, or impossible, to make. Such is not the case with the electric furnace where a change or adjustment in the analysis can be made at any time, and the temperature can be adjusted to just the desired point.

H. H. WATSON
Sales Manager
Pittsburgh Lectromelt Furnace Corp.
P. O. Box 1257
Pittsburgh 30

* * *

OPS Advisory Committee

TO THE EDITORS:

Congratulations on the excellent coverage and material in the March 1952 FOUNDRY. We have noted one omission, however. Erwin R. Jones, Lakey Foundry & Machine Co., Muskegon, Mich., is a member of the Gray Iron Foundry Advisory Committee to the OPS.

D. H. WORKMAN
Executive Vice President
Gray Iron Founders' Society Inc.
Cleveland 14

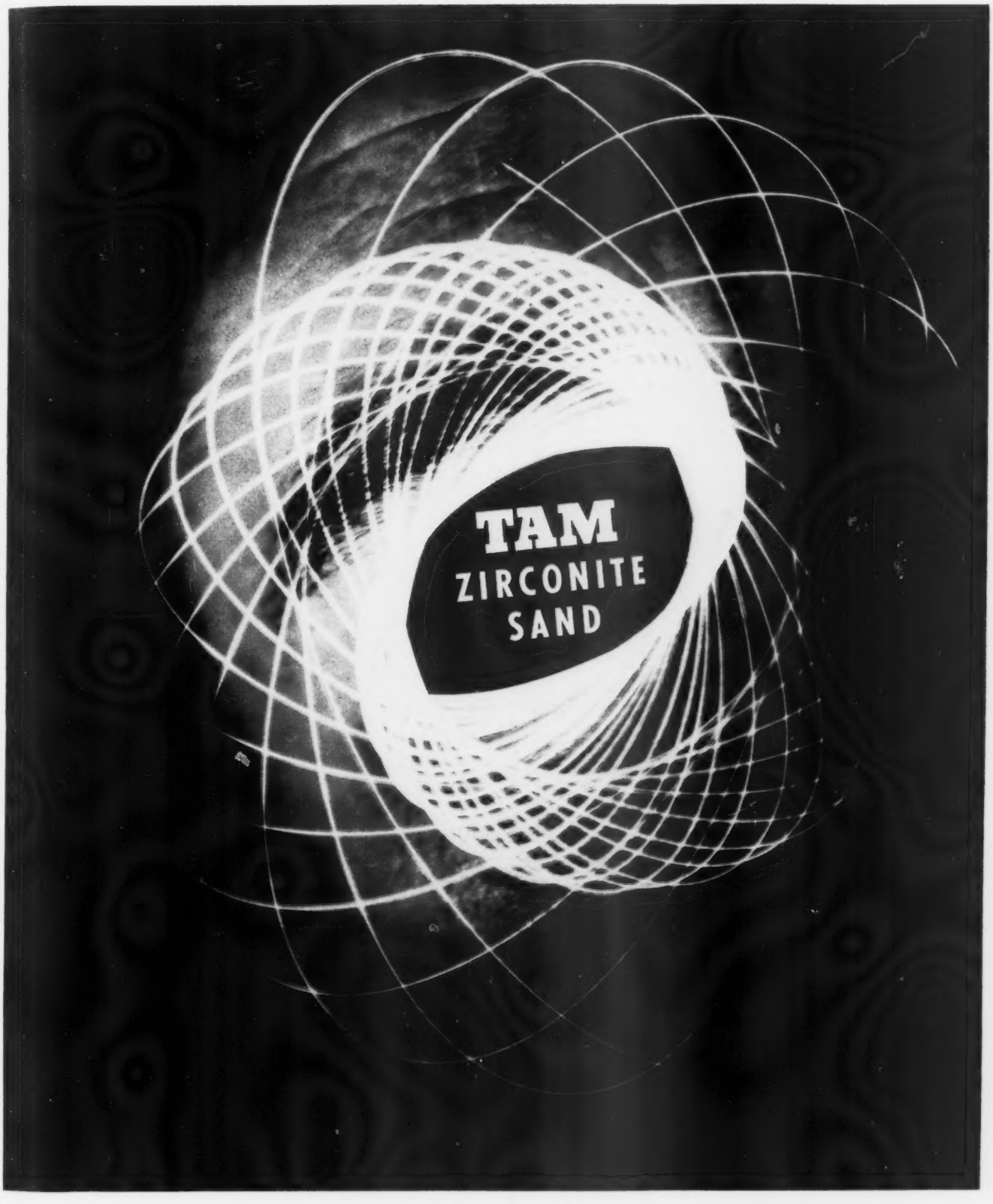
* * *

Exchange of Information

TO THE EDITORS:

We have read with considerable interest the article "Insulation Increases Riser Efficiency" which appeared in the December, 1950 issue of FOUNDRY, and would like to have more details about the material. Is it a special product sold in your country or can it be prepared by the

(*Concluded on page* 118)



CUTS CLEANING COSTS TO THE BONE . . . Because of its high fusion point . . . (well above 4000°F) TAM ZIRCONITE SAND ends burning-in and metal penetration of cores and molds. Easier shake-outs are promoted. These and other advantages will make it worthwhile for you to get detailed facts from our New York City office.

*TAM and ZIRCONITE are registered trademarks.

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FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Concluded from page* 116)

user, and how?

We recently have made some trials with an English product but have the impression it is something with an aluminum and magnesium base and, fearing contamination of the metal in the risers, stopped the trials although we did reduce the weight of the risers about 75 per cent. However, the English product is expensive.

With reference to previous correspondence, we have had very good results with the "Connor" system in

bronze castings, as shown in the accompanying illustration of a valve body showing the riser attachment.

MARIO GALLIENI
Technical Manager
Gallieni Vigano' & Marazzo
Milan, Italy

Editor's Note:—Briefly the material generally used for insulating sleeves is casting plaster composed of about four parts gypsum and one part fibrous talc by weight with or without foaming agents to provide minute air bubbles after the plaster sets. The insulating sleeves mentioned in the article are a product of Exomet Inc., Conneaut, O. English product referred to evidently is an exothermic material which forms a refractory, and we understand that it does not contaminate the metal with which it comes in contact.

The "Connor" system mentioned by Sr. Gallieni and shown in the accompanying illustrations employ a sizable cubical block or riser into which the sprue is gated. The block is attached to the casting by an overlap of about 1/16-in. Previous reference to this method appeared in "Foundry Developments" department in the January, 1951 issue, page 136.

* * *

Wrong Number

TO THE EDITORS:

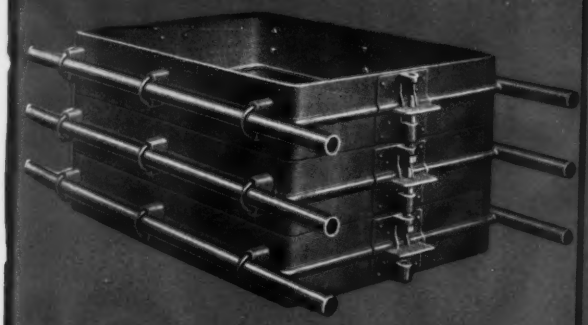
In the article *Develops Pressurized Cupola* presented on pages 152-3-4 in the February issue of FOUNDRY, the statement appears: "The top temperature of a blast furnace rarely exceeds 350° F. The top temperature of a cupola often exceeds 800° F." Obviously this is a missprint. The correct figure for the cupola as given by the author in the original manuscript is 1800° F.

ERNEST F. FISHER
3007 *East 17th Street*
Tucson, Ariz.

Sterling STEEL FLASKS

Product of 43 Years Specialized Experience

More than 4500 foundries have adopted Sterling Steel Flasks for greater efficiency, longer life and more profitable foundry operation. The reason is obvious. Every Sterling Flask is backed by almost a half-century of specialized experience fabricating foundry flasks and equipment to the highest quality standards. The Sterling reputation for correct design and excellent workmanship is known throughout the industry. The next time you have a flask problem, consult Sterling. Our branch office near you will gladly give you information and estimates — or write directly to the Sterling factory at Milwaukee.



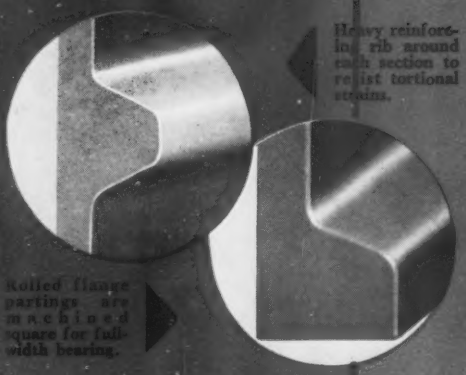
Sterling old-timer produced about 40 years ago. The pipe along the sides acted as a reinforcement and also served as lifting handles.

Modern Sterling heavy-duty flask. Equipped with double pin lugs, cast steel trunnions, steel clamping bars, malleable clamps and special reinforcing bars on cope and drag.

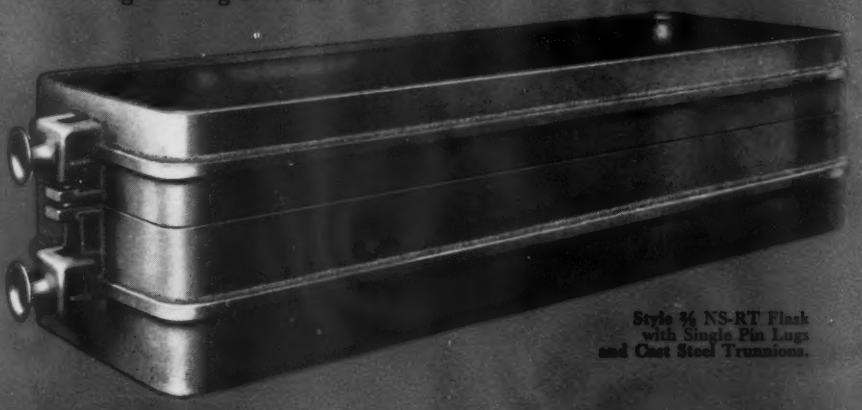
Illustration at left shows the original Sterling factory and office back in 1904. Illustration below shows the modern, spacious Sterling plant today.

Sterling STEEL FLASKS

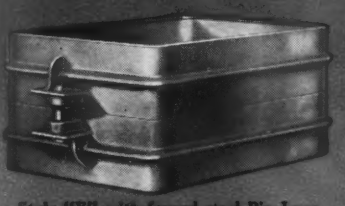
. . . . the *Original* and *Only* Rolled Steel Channel Flask


Heavy reinforcing rib around each section to resist tortional strains.
Rolled flange partings are machined square for full-width bearing.

You can produce BETTER CASTINGS, at a LOWER COST per casting, with dependable Sterling Flasks. Sterlings are fabricated from special rolled steel channel into one solid rigid piece. They withstand tremendous pressures, year after year, and have the strength and rigidity to resist distortion. Sterling originated the famous rolled steel channel construction back in 1909 and has devoted almost a half century in developing and perfecting this popular type of foundry flask. Write today for copy of Sterling Catalog No. 64.

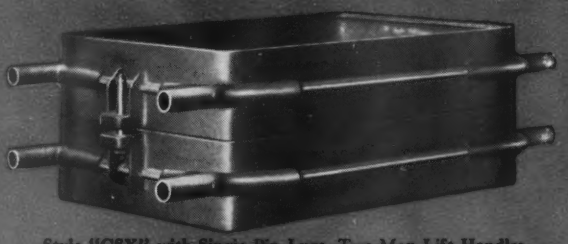


Style 34 NS-RT Flask with Single Pin Lugs and Cast Steel Trunnions.

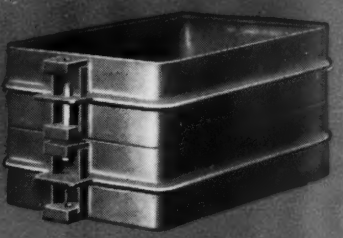


Style "E" with forged steel Pin Lugs and Handles Combined.

Style "H" with two pairs of Pin Lugs Welded on each Side.



Style "GSX" with Single Pin Lugs, Two-Man Lift Handles and Reinforced Corners.

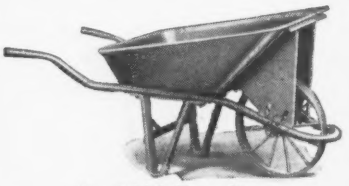


Style "AD" with Double Pin Lugs and Flat Steel Handles.

Style "LS" with large Angle Reinforcement and Two-Man Lift Handles.

Sterling FOUNDRY EQUIPMENT

for Heavy-Duty Foundry Work



No. DF4-S Heavy-Duty Wheelbarrow.

No. 110 Core Truck.

No. 160 Heavy-Duty Casting Truck.

Also Flask Pins (all types) . . . Hardened Steel Bushings . . . Malleable Clamps . . . Steel Bottom Boards . . . Steel Core Plates . . . Squeeze-in Boards . . . Upsets . . . Bands . . . Slag Buggies . . . Casting Carts . . . Steel Wheels . . . Various Types of Wheelbarrows.

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BRANCH OFFICES: BOSTON • BUFFALO • CHICAGO • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • ST. LOUIS.

Got Any Problems?

FLUCTUATING demand for the products of industry, which has been brought about by government action in the areas of both procurement and controls, emphasizes the importance of maintaining progress in both practice and product. In the field of castings, many foundries must seek the best in methods, materials and machinery to meet tremendous demands for castings occasioned by defense and defense-supporting activities. Other producers of castings, who do not have defense work, need to secure similar improvements in production procedures if they are to meet the competition resulting from a slackening in demand for civilian goods.

Information of considerable value in helping the foundry industry solve these diversified problems will be available at the 1952 International Foundry Congress and Show to be staged at Atlantic City, May 1-7, under the auspices of the American Foundrymen's Society. Broad scope of the technical program, magnitude of the exhibits of foundry equipment and supplies, and indications of a record attendance during the week's activities, are factors assuring success of the 1952 congress.

The technical program will include over 100 papers and committee reports to be presented at formal sessions, roundtable discussions and shop courses. An excellent review of recent technical and practical progress, and a view of future production trends, will be provided by this phase of the congress program. Because this is an international meeting and a sizable delegation of overseas foundrymen will be present, the program will include numerous papers sponsored by other members of the International Committee of Foundry Technical Associations.

The exhibition of foundry equipment and supplies will require 100,000 sq ft of space, all located on the main area floor of Atlantic City's great Convention Hall. With a record number of exhibitors and indication of considerable new equipment on display, the 1952 show promises to excel previous exhibits in indicating the path of future progress.

Social features of the convention have not been neglected. Important events include the International Banquet, the Chapter Officers and Directors Dinner, the International Reception and the Alumni Dinner. A special program, including a tea, a musicale and a luncheon and fashion show, will be provided for the approximately 1000 ladies expected to attend.

It is going to be a great foundry week—one that all foundry management and supervisors cannot afford to miss. If you have foundry problems, maybe you can find their solution at Atlantic City.

Frank G. Steinbach
Editor

World

AFS International Foundry Congress and Show at Atlantic City, May 1-7, sets the stage for study of latest developments in foundry technology, equipment and supplies

Foundrymen

SEEK BETTER CASTING PRACTICE

WORLD foundrymen will meet in Atlantic City, N. J., May 1-7, seeking improved methods, equipment and materials for producing better quality castings more efficiently. Their host—for the first time since 1934—will be the American Foundrymen's Society. This International Foundry Congress and Show gives indications of being the most comprehensive of the 56 annual meetings of the AFS from the standpoints of both the technical program and the exhibit of plant facilities and supplies.

Convention Hall on Atlantic City's Boardwalk will be the center of the week's activities. It will serve as AFS headquarters for registration; the Foundry Show will be staged there, and technical sessions other than round-table luncheons will be held in its meeting rooms. The hall's ballroom will be the site of the AFS annual business meeting Saturday morning, May 3, as well as the International Banquet that evening.

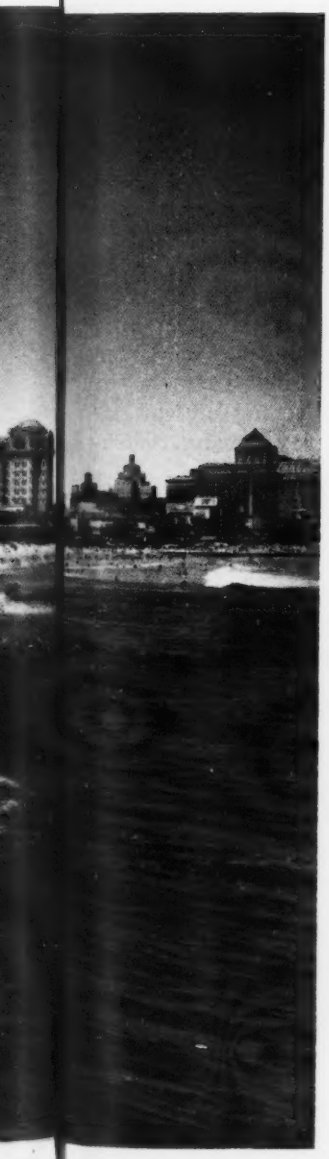
Registration starts at 8:30 a.m. Thursday, May 1, and the Foundry Show opens at 9:30 a.m. Registration fees for the week will be $2 for AFS members and $5 for nonmembers. No fee will be charged those from outside continental North America.

Presence of several hundred visitors from abroad will help to swell attendance at the congress. Occasion for the interest on the part of foreign foundrymen is that this is the annual congress scheduled by the International Committee of Foundry Technical Associations, of which the AFS is a charter member. While an International Congress was held in Detroit in 1926 and in Philadelphia in 1934, the war prevented an earlier return to the United States as the site for the affair. Member countries of the International Committee of Foundry Technical Associations, in addition to the United States, include Belgium, France, Germany, India, Italy, Netherlands, Norway, Sweden, Switzerland and the United Kingdom.

The AFS, in co-operation with the government's Mutual Security Agency, arranged for two study tours by foreign delegates to leading foundry centers prior to the congress. Many visitors arrived in New York from abroad, Apr. 18, to begin their inspection of foundries in Cleveland, Chicago, Cincinnati, Buffalo and Detroit. Overseas guests will be tendered a reception by the AFS Sunday afternoon, May 4, at Atlantic City.

Feature Events—Official opening of the congress will take place Thursday morning at 11:45 at Convention Hall arena. Presiding will be Chester V. Nass, vice president, Beardsley & Piper Division of Pettibone Mulliken Corp., Chicago, who, as president of the National Castings Council, is serving as chairman of the International Congress Committees. Timetable and details of subsequent events on the week's program start on page 126 of this issue.

AFS President Walter L. Seelbach, president, Superior Foundry Inc., Cleveland, will give his annual report to the society membership at the business meeting Saturday morning. This will be followed by the awarding of prizes to winners in the 1952 AFS apprentice contest, and the election of officers and directors of the society for 1952-53. Nominees for these posts, as selected by the Nominating Committee, are:



LECTURER

JOHN S. BUGAS

JOHN S. BUGAS, vice president-industrial relations, Ford Motor Co., Dearborn, Mich., will present the 1952 AFS Charles Edgar Hoyt Annual Lecture at the International Foundry Congress in Atlantic City. Mr. Bugas' lecture, entitled "Frontiers in Industrial Relations," will be given at Convention Hall immediately following the annual business meeting of the society on Saturday morning, May 3.

Mr. Bugas, born in Wyoming in 1908, was educated in that state and was graduated with honors from the law school of the University of Wyoming. Following admittance to the Wyoming bar, he was associated for a short time with a law firm in Cheyenne, Wyo. He resigned in 1935 to accept appointment as a special agent of the Federal Bureau of Investigation. For three years he served with the FBI in various sections of the United States including Washington, Los Angeles, Birmingham and Omaha, Nebr., in addition to a post at Juneau, Alaska. Subsequently he was assigned as special agent in charge of the Detroit office in 1938.

Mr. Bugas resigned from federal service in 1944 to join the Ford Motor Co. where he was named director of industrial relations the following year. In 1946 he was named to his present position as president in charge of industrial relations. He has been a director of the company since 1950. Mr. Bugas served as chairman of the Security Survey Panel of the Atomic Energy Commission in 1950.

President, I. R. Wagner, Electric Steel Castings Co., Indianapolis, and currently national vice pesident; vice president, Collins L. Carter, Albion Malleable Iron Co., Albion, Mich. Directors for three years: Martin A. Fladoes, Sivyer Steel Castings Co., Milwaukee; Walter J. Klayer, Aluminum Industries Inc., Cincinnati; J. O. Klein, Texas Foundries Inc., Lufkin, Tex.; A. D. Matheson, French & Hecht Division, Kelsey-Hayes Wheel Co., Davenport, Iowa; H. G. Robertson, American Steel Foundries, Alliance, O. Director for one year: Retiring President Seelbach.

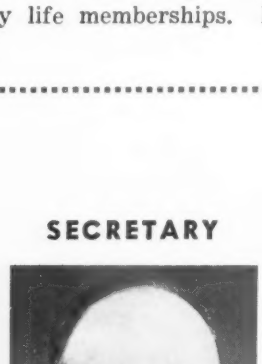
The Charles Edgar Hoyt Annual Lecture, to follow the business meeting, will be given by John S. Bugas, vice president-industrial relations, Ford Motor Co., Dearborn, Mich., on "Frontiers in Industrial Relations."

International Banquet—Record attendance for an AFS banquet appears assured for the International Banquet Saturday evening. Featuring the program will be the awarding of AFS gold medals and honorary life memberships. Details concerning the recipients of these honors will be found starting on page 138. Another presentation, that of the Award of Honor of International Committee of Foundry Technical Associations, will be made by its donor, Comm. Mario Olivo, Milan, Italy. A change in the banquet program this year will substitute well known professional entertainers for the customary banquet speaker.

Dinner Meetings—William J. Grede, president, Grede Foundries Inc., Milwaukee, and recently elected president of the National Association of Manufacturers, will address the annual Alumni dinner, Monday evening, May 5. He will speak on "Our Free Enterprise." This dinner will be open to all interested; at past conventions it was limited to members of the AFS Alumni—present and past officers, directors and recipients of medals and honorary life memberships.

Other dinner meetings scheduled include the Chapter Officers and Directors dinner Friday evening, the annual Canadian dinner Sunday evening and an International Education Dinner Tuesday evening. Speak-

SECRETARY



TOM MAKEMSON

TOM MAKEMSON, secretary of the Institute of British Foundrymen, is observing his 25th year of continuous service to the International Committee of Foundry Technical Associations, which will hold its annual meeting during the AFS International Foundry Congress in Atlantic City. Mr. Makemson was present at the inaugural meeting of the International Committee in Brussels in 1927; he was named honorary secretary of the committee at that time and has continued in the post ever since.

Entering the foundry industry as an apprentice patternmaker, Mr. Makemson later enrolled at Manchester College of Technology and was awarded the diploma of associate of the college in metallurgy. He returned to Metropolitan Vickers Electrical Co., where he had worked for a time as journeyman patternmaker, and served in the foundry, as an apprentice instructor and in the research department. Mr. Makemson became a member of the Institute of British Foundrymen in 1917. Nine years later he resigned his position with Metropolitan Vickers to accept appointment as IBF secretary. In the last 25 years he has seen the membership of the organization grow from 1600 to 5000.

Mr. Makemson was loaned during World War II to the British Ministry of Supply, subsequently becoming director for iron castings. As such he was responsible first for the conversion of British iron foundries to wartime production and later initiated the reverse process of returning them to peacetime production. For these services King George VI created him a member of the Order of the British Empire. In 1947 he was awarded the E. J. Fox Gold Medal of the IBF in recognition of his outstanding services to the British foundry industry as secretary of the institute.

ers at the latter will be Noel P. Newman, past president, and Tom Makemson, secretary, Institute of British Foundrymen.

Ladies Entertainment—The largest number of lady visitors to attend an AFS convention will be attracted to Atlantic City, and various events will be provided for their entertainment. A special committee, made up largely of the entertainment chairmen of past conventions, will maintain registration headquarters at the Sun Deck of Hotel Traymore from Thursday morning through Monday noon. This year's program opens with the annual AFS tea Friday afternoon, with Mrs. Harry W. Dietert chairman and Mrs. Connor B. Shanley and Mrs. John R. Wark co-chairmen. The International Banquet Saturday evening will be the week's social high light. Sunday afternoon a musicale is scheduled under the chairmanship of Mrs. Frank G. Steinebach, with Mrs. Alfred A. Diebold and Mrs. Arthur J. Tuscany serving as co-chairmen. An international luncheon and fashion show Monday noon will have Mrs. R. C. S. Potter as chairman and Mrs. Howard J. Williams and Mrs. A. L. Hunt as co-chairmen. Ladies also are invited to the international reception Sunday afternoon and the Alumni dinner Monday evening.

Technical Program—Foundrymen seeking information on latest developments in casting practice will find a wide range of subjects to select from in the technical program arranged for the International Congress. Of added interest is the fact an unusually large number of papers by foreign foundrymen will be presented. Since the congress extends over seven days it has been possible to schedule the various technical sessions during the daytime; the practical shop courses held in the evening at former conventions will be conducted in the afternoon this year.

All sessions related to nonferrous castings are scheduled for Thursday, Friday and Saturday. Gray Iron Division sessions will be held Sunday, Monday, Tuesday and Wednesday; Malleable Friday, Saturday and Monday; Steel Monday, Tuesday and Wednesday; Patterns Friday and Saturday. Sand sessions extend through the seven days and those of general interest from Friday through Tuesday.

Gray Iron: This division will hold eight technical sessions, two shop courses and a roundtable luncheon. Several papers will deal with cupola operation, including the basic-lined cupola and metallurgical blast cupola. Other subjects include fluidity of cast iron, influence of phosphorus on hot tear resistance, nodular iron, effects of cerium on graphite formation, gases and blowholes, and gating and risering. Shop course subjects will treat mechanics of tuyeres and scrap control.

Aluminum and Magnesium: Four technical sessions and a roundtable luncheon of the light metals division will cover such subjects as aluminum casting defects, heat treatment of magnesium alloy castings, investment casting, plaster casting, mechanical properties of Mg-Zn-Zr alloys, zinc in aluminum casting alloys, and the division's new research film, "Effect of Gating Design on Casting Quality."

Brass and Bronze: Featuring a shop course session sponsored jointly by (*Please turn to page* 190)

Committee Meetings

Various committee meetings of the American Foundrymen's Society and the International Committee of Foundry Technical Associations will be held during the International Foundry Congress in Atlantic City. The schedule follows:

THURSDAY, MAY 1

10 a.m.—Aluminum and Magnesium Division Casting Requirements Committee

3 p.m.—Brass and Bronze Division annual business meeting

FRIDAY, MAY 2

10 a.m.—Educational Division College Research Projects Committee

3 p.m.—Aluminum and Magnesium Division annual business meeting

3 p.m.—Pattern Division annual business meeting

4 p.m.—Malleable Division Research Committee

SATURDAY, MAY 3

2 p.m.—International Committee (main committee)

2:30 p.m.—International Committee (Dictionary of Foundry Terms Subcommittee)

SUNDAY, MAY 4

10 a.m.—International Committee (Cast Iron Testing Methods Subcommittee)

10 a.m.—Gray Iron Division annual business meeting

10 a.m.—Educational Division Apprentice Contest Committee

10 a.m.—Aluminum and Magnesium Division Test Bar Committee

10 a.m.—Sand Division annual business meeting

10 a.m.—Annual Lecture Committee

12 noon—International Committee (Foundry Defects Subcommittee)

2 p.m.—International Committee of Foundry Technical Associations

2 p.m.—AFS Board of Directors Technical Policy Committee

2 p.m.—Educational Division annual business meeting

2 p.m.—Fluidity Testing Committee

MONDAY, MAY 5

2 p.m.—Sand Division Committee 8-J

2 p.m.—Time Study and Methods Committee

3 p.m.—Malleable Division annual business meeting

4 p.m.—Sand Division Flowability Committee

TUESDAY, MAY 6

10 a.m.—Sand Division Deformation Committee

WEDNESDAY, MAY 7

3 p.m.—Steel Division annual business meeting

CONGRESS Program

THURSDAY, MAY 1

8:30 a.m.—Registration begins, Convention Hall

10 a.m.—Ladies' registration begins, Sun Deck, Hotel Traymore

11:45 a.m.—Official Opening Ceremony, arena, Convention Hall. Presiding, C. V. Nass, chairman, International Congress Committees.

12 noon—Brass and Bronze Roundtable Luncheon

Presiding, B. A. Miller, Baldwin-Lima-Hamilton Corp., Philadelphia; co-chairman, H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Pittsburgh
Subject: *Practical Problems—Take Your Pick*

2 p.m.—Aluminum and Magnesium Session

Presiding, A. Cristello, American Light Alloys Inc., Little Falls, N. J.; co-chairman, A. T. Peters, Dow Chemical Co., Bay City, Mich.
2 p.m.—*Aluminum Casting Defects—Their Identification, Causes and Cures*—D. L. LaVelle, American Smelting & Refining Co., Barber, N. J.
2:35 p.m.—*Heat Treatment of Magnesium Alloy Castings*—E. M. Gingerich, Aluminum Co. of America, Cleveland.
3:10 p.m.—*Alloying Zirconium to Magnesium*—W. P. Saunders and F. P. Strieter, Dow Chemical Co., Midland, Mich.

4 p.m.—Aluminum and Magnesium Session

Presiding, Hiram Brown, Solar Aircraft Co., Des Moines, Iowa; co-chairman, W. E. Sicha, Aluminum Co. of America, Cleveland
4 p.m.—*Investment Casting of Aluminum*—H. Rosenthal and S. Lipson, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia
4:50 p.m.—*Some Practical Applications of Permeable Metal Casting Plaster*—R. F. Dalton, United States Gypsum Co., Chicago

4 p.m.—Sand Shop Course—Nonferrous

Presiding, W. B. Scott, National Bearing Division, American Brake Shoe Co., Meadville, Pa.; co-chairman, J. W. Clarke, General Electric Co., Erie, Pa.
Subject: *Synthetic vs. Naturally Bonded Sands.* Discussion Leaders: F. S. Brewster, Harry W. Dietert Co., Detroit; C. A. Sanders, American Colloid Co., Chicago; H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.; H. H. Fairfield, Wm. Kennedy & Sons Ltd., Owen Sound, Ont., Canada

FRIDAY, MAY 2

10 a.m.—Aluminum and Magnesium Session

Presiding, W. J. Klayer, Aluminum Industries Inc., Cincinnati; co-chairman, T. E. Kramer, William F. Jobbins Inc., Aurora, Ill.
10 a.m.—*Mechanical Properties of Sand Cast Magnesium-Zinc-Zirconium Alloys*—J. F. Hildebrand and F. P. Strieter, Dow Chemical Co., Midland, Mich.
10:35 a.m.—*High Strength Non Heat-Treated Aluminum Casting Alloys*—Walter Bonsack, Christiansen Corp., Chicago
11:10 a.m.—*Zinc in Aluminum Casting Alloys*—D. L. Colwell, Apex Smelting Co., Chicago

10 a.m.—Brass and Bronze Session

Presiding, G. P. Halliwell, H. Kramer & Co., Chicago; co-chairman, H. J. Roast, foundry consultant, London, Ont., Canada
10 a.m.—*Effects of Gating Practice on Leak Tightness of 85-5-5-5 and 81-3-7-9 Alloy Castings*—J. G. Kura, Battelle Memorial Institute, Columbus, and L. W. Eastwood, Kaiser Aluminum & Chemical Corp., Spokane, Wash.
10:50 a.m.—*Influence of Aluminum on Properties of Cast Gun-Metal and Removal of Aluminum by Slag*—Official Swedish Exchange Paper, A. V. Larsson, AB Svenska Metallverken, Vasteras, Sweden.

10 a.m.—Pattern Session

Presiding, H. E. Lees, Whitin Machine Works, Whitinsville, Mass.; co-chairman: Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit
10 a.m.—*Coreboxes from Core Plugs*—J. E. Mathias, Accurate Match Plate Co., Chicago
10:50 a.m.—*Patternmaking to Compensate for Shrink Allowance*—M. K. Young, United States Gypsum Co., Chicago

10 a.m.—Sand Session

Presiding, C. C. Sigerfoos, Michigan State College, East Lansing; co-chairman, V. M. Rowell, Archer-Daniels-Midland Co., Cleveland

10 a.m.—*Olivine Application in the Foundry*—G. S. Schaller, University of Washington, Seattle.

10:35 a.m.—*The Mechanism of Bonding in Foundry Molding Sands*—L. M. Diran and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

11:10 a.m.—*Practical Aspects of Olivine as a Molding Material*—Official Norwegian Exchange Paper—John Sissener and Bjorn Langum, A/S Myrens Verksted, Bentsbrought, Oslo, Norway.

12 noon—Aluminum-Magnesium Roundtable Luncheon

Presiding, W. E. Sicha, Aluminum Co. of America, Cleveland. Discussion leaders: (Aluminum)—T. D. Stay, Reynolds Metals Co., Cleveland; (Magnesium)—C. C. Hitchcock, R. C. Hitchcock & Sons Inc., Minneapolis. Subject: *Sand Casting Practice for Aluminum and Magnesium Alloys*

12 noon—Pattern Roundtable Luncheon

Presiding, E. T. Kindt, Kindt-Collins Co., Cleveland; co-chairman: A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee.

Pattern Apprentice Training Program—F. W. Burgdorfer, Missouri Pattern Works, St. Louis.

New Methods in Metal Patternmaking—H. J. Jacobson, Industrial Pattern Works, Chicago.

2 p.m.—Brass and Bronze Session

Presiding, C. A. Robeck, Gibson & Kirk Co., Baltimore; co-chairman: B. F. Shepard, Ingersoll-Rand Co., Phillipsburg, N. J.

2 p.m.—*Effects of Mold Materials on Leak Tightness and Mechanical Properties of* 85-5-5-5 *and* 81-3-7-9 *Alloy Castings*—J. G. Kura, Battelle Memorial Institute, Columbus, and L. W. Eastwood, Kaiser Aluminum & Chemical Corp., Spokane, Wash.

2:50 p.m.—*Fracture Characteristics and Melt Quality of* 85-5-5-5 *Red Brass and Other Copper-Base Alloys*—Research Progress Report—C. Upthegrove, University of Michigan, Ann Arbor, and F. B. Rote, Albion Malleable Iron Co., Albion, Mich.

2 p.m.—Malleable and Refractories Session
(Jointly Sponsored by Malleable Division and Refractories Committee)

Presiding, W. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.; co-chairman: Eric Welander, Union Malleable Iron Works, East Moline, Ill.

2 p.m.—*Refractory Practice as Applied to Malleable Duplexing*—C. W. Meyer, Central Foundry Division, Saginaw Malleable Iron Plant, Saginaw, Mich.

2:35 p.m.—*Air Furnace Refractory Practice in Cupola-Air Furnace Duplexing*—W. C. Corbeau, National Malleable & Steel Castings Co., Cleveland.

3:10 p.m.—*Refractories Applied to Batch Type Air Furnaces*—C. O. Schopp and P. F. Ulmer, Link-Belt Co., Indianapolis.

4 p.m.—Sand Shop Course—Nonferrous

Presiding, R. H. Jacoby, the Key Co., East St. Louis, Ill.; co-chairman, B. N. Ames, New York Naval Shipyard, Brooklyn.

Subject: *Symposium on Shell Molding.* Discussion leaders: Vaughan C. Reid, City Pattern Foundry & Machine Co., Detroit; R. W. Crannell, Lehigh Foundries, Inc., Easton, Pa.; N. A. Kahn, New York Naval Shipyard, Brooklyn; E. N. Harrison, Econocast, Inc., Chattanooga, Tenn.; H. K. Salzberg, Borden Co., Bainbridge, N. Y.

6:30 p.m.—Chapter Officers and Directors Dinner
Presiding, AFS President Walter L. Seelbach

SATURDAY, MAY 3

9:30 a.m.—Annual Business Meeting, ballroom, Convention Hall

Presiding, AFS National President W. L. Seelbach.

Welcome to international delegates

President's annual address

Apprentice contest awards

Election of officers and directors

11 a.m.—Charles Edgar Hoyt Annual Lecture, ballroom, Convention Hall

Frontiers in Industrial Relations—John S. Bugas, vice president, industrial relations, Ford Motor Co., Dearborn, Mich.

12 noon—Exhibits open

2 p.m.—Pattern Session

Presiding, V. J. Sedlon, Master Pattern Co., Cleveland; co-chairman, H. C. Swanson, Arrow Pattern & Foundry Co., Chicago

2 p.m.—*Practical Construction of Wood Patterns*—Walter Siebert, Elyria Foundry Division, Industrial Brownhoist Co., Elyria, O.

2:50 p.m.—*Patterns for Malleable and Steel Foundries*—J. M. Kreiner, National Malleable & Steel Castings Co., Cleveland

2 p.m.—Sand Session

Presiding, H. J. Williams, New Jersey Silica Sand Co., Millville, N. J.; co-chairman, Stanton Walker, National Industrial Sand Association, Washington

2 p.m.—*Mineral Perlite and Its Uses in the Foundry*—E. D. Boyle and H. R. Wolfer, Puget Sound Naval Shipyard, Bremerton, Wash.

2:35 p.m.—*Influence of Specimen Tube Loading and Riddle Size on Molding Sand Test Results*—D. I. Huizenga, Albion Malleable Iron Co., Albion, Mich., and K. E. Spray, U. S. Bureau of Ships, Washington

3:10 p.m.—*A Study of the AFS Fineness Test*—Official Exchange Paper, Institute of Australian Foundrymen (Victoria Division)—H. A. Stephens, Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia

3 p.m.—Aluminum and Magnesium Session

Presiding, R. F. Thomson, Research Laboratories Division, General Motors Corp., Detroit; co-chairman: T. D. Stay, Reynolds Metals Co., Cleveland

3 p.m.—AFS Aluminum and Magnesium Research Progress Report—motion picture, *Effect of Gating Design on Casting Quality*—K. Grube and J. H. Jackson, Battelle Memorial Institute, Columbus

3 p.m.—Brass and Bronze Session

Presiding, W. A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y.; co-chairman: B. W. Schafer, Detroit Electric Furnace Division, Bay City, Mich.

3 p.m.—*Effect of Lead and Nickel on Grain Size of Certain Cast Copper-Base Alloys*—R. A. Colton, F. L. Turk and D. L. LaVelle, American Smelting & Refining Co., Barber, N. J.

3:35 p.m.—*Use of Aluminum Bronze in High Pressure Castings*—T. C. Bunch and G. E. Dalbey, Mare Island Naval Shipyard, Vallejo, Calif.

4:10 p.m.—*Melting in High Speed Reverberatory Furnace*—R. G. Carlson and W. B. Scott, National Bearing Division, American Brake Shoe Co., Meadville, Pa.

4 p.m.—Malleable Session

Presiding, W. K. Bock, National Malleable & Steel Castings Co., Cleveland; co-chairman: F. B. Rote, Albion Malleable Iron Co., Albion, Mich.

4 p.m.—*A Test for Hot Tearing Tendency*—AFS Research Progress Report—A. E. Lange and R. W. Heine, University of Wisconsin, Madison

4:50 p.m.—*Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and Other Properties of Malleable Iron*—AFS Research Progress Report—A. E. Lange and R. W. Heine, University of Wisconsin, Madison

4 p.m.—Safety, Hygiene and Air Pollution Session

Presiding, A. L. Hunt, National Bearing Division, American Brake Shoe Co., St. Louis; co-chairman: C. K. Faunt, Christensen & Olsen Foundry Co., Chicago

4 p.m.—*Ventilation at Nonferrous Melting and Pouring Operations*"—H. J. Weber, American Brake Shoe Co., Chicago

4:50 p.m.—*How to Maintain Foundry Ventilation and Dust Collecting Systems*—K. M. Smith, Caterpillar Tractor Co., Peoria, Ill.

4 p.m.—Sand Session

Presiding, O. J. Myers, Archer-Daniels-Midland Co., Minneapolis; co-chairman: W. G. Parker, Elmira Foundry Co., Elmira, N. Y.

4 p.m.—*Influence of Oven Atmosphere on Drying of Molds and Baking of Cores*—Georges Ulmer and Maurice DeCrop, Centre Technique des Industries de la Fonderie, Paris, France

4:50 p.m.—*Flowability of Foundry Sands*—L. M. Diran, A. J. Shaler and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

7:30 p.m.—International Banquet, ballroom, Convention Hall

Presiding, Walter L. Seelbach, president, AFS. Presentation of AFS gold medal awards and honorary life memberships. Presentation of Award of Honor of the International Committee of Foundry Technical Associations. Entertainment program

SUNDAY, MAY 4

2 p.m.—Gray Iron Session

Presiding, J. S. Vanick, International Nickel Co., New York; co-chairman: N. A. Birch, National Bearing Division, American Brake Shoe Co., Meadville, Pa.

2 p.m.—*A New Process for the Industrial Production of Nodular Iron With Low Treatment Costs*—Official Exchange Paper, Italian Metallurgical Association—Carlo Longaretti and Mario Noris, Institute for Siderurgy Finsider, Genoa, Italy

2:50 p.m.—*Production of Heavy Spheroidal Graphite Cast Iron Gears*—Corrado Galletto, Centro d'Informazioni del Nickel, Milano, Italy

3:10 p.m.—*Gases and Naturally Occurring Blowholes in Foundry Practice*—Official Exchange Paper, Association Technique de Fonderie de France—A. M. Portevin, Institut de France, Paris.

5 p.m.—International Reception, Ambassador Hotel

7 p.m.—Canadian Dinner, Hotel Traymore

MONDAY, MAY 5

8 a.m.—National Castings Council annual meeting

8:30 a.m.—Past Presidents' breakfast

10 a.m.—Gray Iron Session

Presiding, J. D. Sheley, the Black Clawson Co., Hamilton, O.; co-chairman: R. A. Clark, Electro Metallurgical Division, Union Carbide & Carbon Corp., Detroit

10 a.m.—*How Iron and Steel Melt in a Cupola*—H. W. Lownie, Jr. and C. T. Greenidge, Battelle Memorial Institute, Columbus, and D. E. Krause, Gray Iron Research Institute, Columbus

10:35 a.m.—*Melting Iron in a Basic-Lined, Water-Cooled Cupola*—W. W. Levi, Lynchburg Foundry Co., Radford, Va.

11:10 a.m.—*Metallurgical Blast Cupola*—Official Belgian Exchange Paper—Robert Doat, Compagnie Generał des Conduites d'Eau, Liege, Belgium, and M. A. DeBock, consulting engineer, Brussels, Belgium

10 a.m.—Steel Session

Presiding, C. B. Jenni, General Steel Castings Corp., Eddystone, Pa.; co-chairman: Dale Hall, Oklahoma Steel Casting Co., Tulsa, Okla.

10 a.m.—*The Substitution of Boron for Alloys in Cast Steel*—R. A. Dyke Jr., and C. K. Donoho, American Cast Iron Pipe Co., Birmingham

10:50 a.m.—*Application of Chills to Increase the Feeding Range of Risers*—E. T. Myskowski, H. F. Bishop and W. S. Pellini, Naval Research Laboratory, Washington

10 a.m.—Safety, Hygiene and Air Pollution Session

Presiding, F. W. Shipley, Caterpillar Tractor Co., Peoria, Ill.; co-chairman: J. R. Allan, International Harvester Co., Chicago

10 a.m.—*The AFS Safety, Hygiene and Air Pollution Program*—J. R. Allan, chairman, AFS Safety, Hygiene and Air Pollution Committee—International Harvester Co., Chicago

10:15 a.m.—*Air Pollution and the Foundry Industry*—H. P. Munger, Battelle Memorial Institute, Columbus

11 a.m.—*Health Problems of the Metal Castings Industry*—D. A. Irwin, M.D., Aluminum Co. of America, Pittsburgh

10 a.m.—Time Study and Methods Session

Presiding, L. W. Lehman, John Deere Van Brunt Co., Horicon, Wis.; co-chairman, H. R. Williams, Williams Management Engineering, Milwaukee

10 a.m.—*Use of Motion Pictures for Foundry Motion and Timestudy*—M. E. Mundel, Purdue University, Lafayette, Ind.

10:35 a.m.—*Application of Motion Pictures for Motion and Timestudy in the Foundry*—M. T. Sell, Sterling Foundry Co., Wellington, O.

11:10 a.m.—*Applied Waste Control Principles*—J. R. Walley, Helmick and Associates, Canton, O.

10 a.m.—Malleable Session

Presiding, W. M. Albrecht, Chain Belt Co., Milwaukee; co-chairman, P. F. Ulmer, Link-Belt Co., Indianapolis

10 a.m.—*Effect of Phosphorus Content on Graphitization Rate and Mechanical Properties of Black Heart Malleable Iron*—J. E. Rehder, Department of Mines and Technical Surveys, Ottawa, Ont., Canada

10:50 a.m.—*Malleable Iron Annealing Time Reduced*—W. G. Wilson and N. F. Tisdale Jr., Molybdenum Corp. of America, Pittsburgh

10 a.m.—Sand Session

Presiding, J. B. Caine, consultant, Wyoming, O.; co-chairman: H. W. Dietert, Harry W. Dietert Co., Detroit

10 a.m.—*Pneumatic Reclamation for Foundry Sands*—C. E. Wenninger, National Engineering Co., Chicago

10:35 a.m.—*Reclaiming Used Molding Sands by Air Scrubbing*—H. H. Fairfield, J. McConachie, and H. F. Graham, Wm. Kennedy & Sons Ltd., Owen Sound, Ont., Canada

11:10 a.m.—*Sand Control with Particuler Reference to the Prevention of Scabbing*—Official Exchange Paper, Institute of British Foundrymen—W. B. Parkes, British Cast Iron Research Association, Birmingham, England

12 noon—Malleable Roundtable Luncheon

Presiding, J. H. Lansing, Malleable Founders' Society, Cleveland; co-chairman: W. A. Kennedy, the Grinnell Co., Inc., Providence, R. I.

Subject: *Dielectric Core Baking.* Discussion leaders: K. H. Hamblin, the Grinnell Co., Inc., Providence, R. I.; P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill.

Subject: *Fluidity Tests.* Discussion leader: P. C. Rosenthal, University of Wisconsin, Madison

2 p.m.—Chapter Educational Activities Session

Presiding, F. G. Sefing, International Nickel Co. Inc., New York; co-chairman: E. W. Horlebein, Gibson & Kirk Co., Baltimore

Speakers: Northwestern Pennsylvania Chapter—E. M.

Strick, Erie Malleable Iron Co., Erie, Pa.; Southern California Chapter—Robert Gregg, Reliance Regulator Division, American Meter Co., Alhambra, Calif.; Philadelphia Chapter—A. N. Kraft, Wilkening Mfg. Co., and H. E. Mandel, Pennsylvania Foundry Supply & Sand Co., Philadelphia

2 p.m.—Plant and Plant Equipment Session

Presiding, James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.; co-chairman, R. J. Wolf, Stone & Webster Engineering Corp., Boston

2 p.m.—*Development and Application of Molding Machines for the Production of Light Castings*—A. S. Hedberg, Wells Mfg. Co., Skokie, Ill.

2:50 p.m.—*Development and Application of Machines for the Making of Molds by Slinging*—Martin Putz, Fairbanks, Morse & Co., Freeport, Ill.

2 p.m.—Safety, Hygiene and Air Pollution Session

Presiding, J. M. Kane, American Air Filter Co., Louisville; co-chairman, F. A. Patty, General Motors Corp., Detroit

2 p.m.—*The Single Objective Approach to Foundry Safety*—Dan Farrell, United States Steel Co., Pittsburgh

2:50 p.m.—*Air Pollution and the Cupola*—J. Radcliffe, Ford Motor Co., Dearborn, Mich.

2 p.m.—Gray Iron Session

Presiding, J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham; co-chairman, T. J. Wood, American Brake Shoe Co., Mahwah, N. J.

2 p.m.—*Production Experiences with a Basic Cupola*—S. F. Carter, American Cast Iron Pipe Co., Birmingham, Ala.

2:35 p.m.—*Factors Affecting Fluidity of Cast Iron*—L. F. Porter and P. C. Rosenthal, University of Wisconsin, Madison

3:10 p.m.—*Influence of Phosphorus on Hot Tear Resistance of Plain and Alloy Gray Iron*—J. C. Hamaker, Jr., General Iron Works Co., Denver, and W. P. Wood, University of Michigan, Ann Arbor

2 p.m.—Steel Session

Presiding, R. H. Jacoby, the Key Co., East St. Louis, Ill.; co-chairman, R. H. Frank, Bonney-Floyd Co., Columbus, O.

2 p.m.—*Metallurgy and Mechanics of Hot Tearing*—H. F. Bishop, C. G. Ackerlind and W. S. Pellini, Naval Research Laboratory, Washington

2:35 p.m.—*Hot Tear Formation in Steel Castings*—U. K. Bhattacharya, C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

3:10 p.m.—*Investigation of Hot Tears in Steel Castings*—Research Progress Report (in three parts): Part I, Gordon Johnson, Armour Research Foundation, Chicago; Part II, G. A. Lillieqvist, American Steel Foundries, East Chicago, Ind.; and Part III, Clyde Wyman, committee chairman, Burnside Steel Foundry Co., Chicago

4 p.m.—Gray Iron Shop Course

Presiding, K. H. Priestley, Vassar Electroloy Products Inc., Vassar, Mich.; co-chairman, E. J. Burke, Hanna Furnace Corp., Buffalo

Subject: *Scrap Control by Sampling.* Discussion leader: R. W. Gardner, Dearborn Iron Foundry, Ford Motor Co., Dearborn, Mich.

4 p.m.—Sand Shop Course

Presiding, H. W. Meyer, General Steel Castings Corp., Granite City, Ill.; co-chairman, F. S. Brewster, Harry W. Dietert Co., Detroit

Subject: *Use of High Density Molding Materials in the Foundry.* Discussion leader: W. M. Peterson, M. A. Bell Co., St. Louis

4 p.m.—Chapter Educational Activities Session (Continued)

4 p.m.—Foundry Cost Session

Presiding, R. L. Lee, Grede Foundries Inc., Milwaukee; co-chairman, G. E. Tisdale, Zenith Foundry Co., Milwaukee

Subject: *Question and Answer Panel.* Discussion leaders: C. S. Roberts, Dodge Steel Co., Philadelphia; C. E. Westover, Westover Engineers, Milwaukee; W. A. Gluntz, Gluntz Brass & Aluminum Foundry Co., Cleveland

4 p.m.—Plant and Plant Equipment Session

Presiding, James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.; co-chairman, H. W. Johnson, Wells Mfg. Co., Skokie, Ill.

4 p.m.—*Development and Application of Molding Ma-*

chines for Production of Medium and Heavy Castings—K. M. Smith, Caterpillar Tractor Co., Peoria, Ill.

4:35 p.m.—*Special and Automatic Molding Machines*—K. M. Smith, Caterpillar Tractor Co., Peoria, Ill.

5:10 p.m.—Motion picture—*Mechanization in Molding, II*—H. C. Weimer, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago

4 p.m.—Gray Iron Session

Presiding, W. H. White, Jackson Iron & Steel Co., Jackson, O.

4 p.m.—*Commercial Experience with Higher Silicon Nodular Irons*—R. Schneidewind, University of Michigan, Ann Arbor, and H. H. Wilder, Vanadium Corp. of America, Detroit

4:50 p.m.—*Effects of Cerium on Graphite Formation in Alloy Cast Iron*—E. A. Rowe, University of Washington, Seattle, and H. A. Johnson, Hanford Engineering Works, Richland, Wash.

7:15 p.m.—AFS Alumni Dinner, Hotel Traymore

Presiding, W. L. Woody, National Malleable & Steel Castings Co., Cleveland. Speaker: Wm. J. Grede, president, National Association of Manufacturers and Grede Foundries Inc., Milwaukee. Subject: *Our Free Enterprise*

TUESDAY, MAY 6

10 a.m.—Foundry Cost Session

Presiding, R. L. Lee, Grede Foundries Inc., Milwaukee; co-chairman, M. E. Annich, American Brake Shoe Co., Mahwah, N. J.

10 a.m.—*Pricing Castings Using Standard Costs*—J. A. Westover, Westover Engineers, Milwaukee

10 a.m.—Educational Session

Presiding, G. J. Barker, University of Wisconsin, Madison; co-chairman, W. J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind.

10 a.m.—*Management's Responsibility in the Training Program*—J. D. Judge, Hamilton Foundry & Machine Co., Hamilton, O.

10:50 a.m.—*Apprentice Training—It Is Needed*—M. C. Sandes, Mare Island Naval Shipyard, Vallejo, Calif.

10 a.m.—Gray Iron Session

Presiding, F. T. McGuire, Deere & Co., Moline, Ill.; co-chairman, W. A. Hambley, Chas. A. Krause Milling Co., Birmingham, Mich.

10 a.m.—*Effect of Sulphur on the Fluidity of Gray Cast Iron*—L. F. Porter and P. C. Rosenthal, University of Wisconsin, Madison

10:35 a.m.—*Internal Porosity in Gray Iron Castings*—J. C. Hamaker Jr., General Iron Works Co., Denver, W. P. Wood, University of Michigan, Ann Arbor, and F. B. Rote, Albion Malleable Iron Co., Albion, Mich.

11:10 a.m.—*Effect of Hydrogen on Graphitization*—B. F. Brown, North Carolina State College, Raleigh, and M. F. Hawkes, Carnegie Institute of Technology, Pittsburgh

10 a.m.—Heat Transfer Session

Presiding, H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland; co-chairman, E. C. Troy, foundry engineer, Palmyra, N. J.

10 a.m.—*Heat Flow in Moist Sand*—Research Progress Report—V. Paschkis, Columbia University, New York

10:50 a.m.—*Solidification of Nodular Iron in Sand Molds*—R. P. Dunphy and W. S. Pellini, Naval Research Laboratory, Washington

10 a.m.—Steel Session

Presiding, H. H. Johnson, National Malleable & Steel Castings Co., Sharon, Pa.; co-chairman, R. W. Gardner, Dearborn Iron Foundry, Ford Motor Co., Dearborn, Mich.

10 a.m.—*The Whys and Wherefores of Statistical Quality Control*—W. R. Weaver (president, American Society for Quality Control), Republic Steel Corp., Cleveland

10:50 a.m.—*Foundry Management Looks at Statistical Quality Control*—E. L. Fay, Deere & Co., Moline, Ill.

12 noon—Gray Iron Roundtable Luncheon

Presiding, R. J. Allen, Worthington Corp., Harrison, N. J.; co-chairman, C. O. Burgess, Gray Iron Founders' Society, Cleveland

Subject: *Reclamation of Gray Iron Castings*

12 noon—Equipment and Supplies Luncheon

Presiding, C. V. Nass, president, Foundry Equipment

Manufacturers Association, and L. H. Heyl, president, Foundry Facings Manufacturers Association

2 p.m.—Refractories Session

Presiding, R. H. Stone, Vesuvius Crucible Co., Swissvale, Pa.; co-chairman, W. R. Jaeschke, Whiting Corp., Harvey, Ill.

2 p.m.—*Fundamentals of Foundry Refractories*—J. S. McDowell and J. D. Custer, Harbison-Walker Refractories Co., Pittsburgh

2:50 p.m.—*Effect of Slag on Furnace Linings*—L. B. Wyckoff, Lewiston, N. Y.

2 p.m.—Steel Session

Presiding, A. A. Evans, International Harvester Co., Indianapolis; co-chairman, George Ver Beke, Union Malleable Iron Works, East Moline, Ill.

2 p.m.—*Quality Control in a Malleable Iron Foundry*—E. F. Price and O. K. Hunsaker, Dayton Malleable Iron Co., Ironton, O.

2:50 p.m.—*Quality Control in a Jobbing Steel Foundry*—H. H. Fairfield, Wm. Kennedy & Sons Ltd., Owen Sound, Ont., Canada

2 p.m.—Time Study and Methods Session

Presiding, J. E. Hyland, John Deere Spreader Works, East Moline, Ill.; co-chairman, C. J. Pruett, McWane Cast Iron Pipe Co., Birmingham

2 p.m.—*Standards for Rough Chipping and Removing Welds*—Dean Van Order, Burnside Steel Foundry Co., Chicago

2:50 p.m.—*A Melt Department Incentive Plan*—E. G. Tetzlaff, Pelton Steel Casting Co., Milwaukee

2 p.m.—Heat Transfer Session

Presiding, H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland; co-chairman, J. B. Caine, foundry consultant, Wyoming, O.

2 p.m.—*A Simplified Analysis of Riser Treatments*—C. M. Adams Jr. and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

2:50 p.m.—*Space Time and Temperature Relations During Casting of Metals*—Official Dutch Exchange Paper—J. S. Abcouwer, Werkspoor N. V., Utrecht, Holland. (To be presented by Ir A. Baron Krayenhoff, Amersfoort, Holland).

4 p.m.—Gray Iron Session

Presiding, J. E. Rehder, Department of Mines & Technical Surveys, Ottawa, Ont., Canada; co-chairman, V. A. Crosby, Climax Molybdenum Co., Detroit

4 p.m.—*Effect of Percentage of Nodular Graphite on Certain Mechanical Properties of Magnesium-Treated Cast Iron*—R. W. Lindsay, Pennsylvania State College, State College, Pa., and Alvin Shames, North American Aviation Inc., Columbus, O. (formerly with Battelle Memorial Institute, Columbus)

4:35 p.m.—*Time of Formation of Spherulites in Hypo- and Hyper-Eutectic Irons*—J. Keverian, C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

5:10 p.m.—*A Study of the Formation of Nodular Graphite*—Fredrik Hurum, Norway Institute of Technology, Trondheim. (To be presented by J. Keverian, Massachusetts Institute of Technology, Cambridge.)

4 p.m.—Gray Iron Shop Course

Presiding, W. W. Levi, Lynchburg Foundry Co., Radford, Va.; co-chairman, E. J. Burke, Hanna Furnace Corp., Buffalo

Subject: *Mechanics of Tuyeres.* Discussion leaders: H. H. Wilder, Vanadium Corp. of America, Detroit, and Carl Harmon, Hanna Furnace Corp., Buffalo

4 p.m.—Sand Shop Course

Presiding, B. H. Booth, Carpenter Bros. Inc., Milwaukee; co-chairman, R. H. Olmsted, Whitehead Bros. Co., New York

Subject: *Household Hints and Tips.* Panel members: T. E. Barlow, Eastern Clay Products Div., International Chemicals & Minerals Co., Jackson, O.; C. Crawford, Frederic B. Stevens, Inc., Detroit; T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.; R. L. McIlwaine, National Engineering Co., Chicago; O. J. Myers, Archer-Daniels-Midland Co., Minneapolis; C. V. Nass, Beardsley & Piper Div., Pettibone-Mulliken Corp., Chicago; John Owen, Harbison-Walker Refractories Co., Chicago; J. A. Rassenfoss, American Steel Foundries, East Chicago, Ind.; J. S. Schumacher, Hill & Griffith Co., Cincinnati

4 p.m.—Refractories and Gray Iron Session

Presiding, R. A. Witschey, A. P. Green Fire Brick Co., Chicago; co-chairman, W. W. Levi, Lynchburg Foundry Co., Radford, Va.

4 p.m.—*Basic Refractories for Cupola Service*—M. W. Demler, Harbison-Walker Refractories Co., Pittsburgh

4:50 p.m.—*Refractories for the Basic Cupola*—H. M. Kraner, Bethlehem Steel Co., Bethlehem, Pa.

7 p.m.—International Education Dinner

Presiding, I. R. Wagner, vice president, AFS co-chairman, C. L. Carter, Albion Malleable Iron Co., Albion, Mich.

Speakers: Noel P. Newman, past president, Institute of British Foundrymen, Newman, Hender & Co., Gloucester, England, and Tom Makemson, secretary, Institute of British Foundrymen

WEDNESDAY, MAY 7

10 a.m.—Gray Iron Session

Presiding, A. P. Gagnebin, International Nickel Co., Bayonne, N. J.; co-chairman, R. Schneidewind, University of Michigan, Ann Arbor

10 a.m.—*Physical Properties of Spheroidal Graphite Cast Iron*—Technical Report No. 1 for Watertown Arsenal—C. C. Reynolds and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

10:35 a.m.—*A Solidification Dilatometer and Its Application to Gray Iron*—R. P. Dunphy and W. S. Pellini, Naval Research Laboratory, Washington

11:10 a.m.—*Influence of Some Residual Elements, and Their Neutralization, in Magnesium-Treated Nodular Iron*—H. Morrogh, British Cast Iron Research Association, Birmingham, England

10 a.m.—Sand Session

Presiding, J. H. Lowe, Milwaukee; co-chairman, E. C. Zirzow, Werner G. Smith Inc., Cleveland

10 a.m.—*Veining Tendencies of Cores*—Progress Report of Sand Committee 8-J,—V. M. Rowell, Archer-Daniels-Midland Co., Cleveland

10:35 a.m.—*Steel Sands at Elevated Temperatures*—Progress Report of Research Project—R. G. Thorpe, A. E. Riccardo, P. L. Widener and P. E. Kyle, Cornell University, Ithaca, N. Y.

11:10 a.m.—*Effect of Binders and Additives on Ductility in Molding Sands at Elevated Temperatures*—R. E. Morey, C. G. Ackerlind and W. S. Pellini, Naval Research Laboratory, Washington

10 a.m.—Steel Session

Presiding, C. H. Lorig, Battelle Memorial Institute, Columbus; co-chairman, Charles Locke, Atlas Foundry & Machine Co., Tacoma, Wash.

10 a.m.—*Steel Desulphurization with Injected Carbide*—S. F. Carter, American Cast Iron Pipe Co., Birmingham

10:50 a.m.—*Cutting with Ultra-High Purity Oxygen*—E. H. Roper and J. F. Kiernan, Air Reduction Sales Co., New York.

12 noon—Steel Roundtable Luncheon

Presiding, J. B. Caine, consultant, Wyoming, O.; co-chairman, V. E. Zang, Unitcast Corp., Toledo, O.

2 p.m.—Gray Iron Session

Presiding, J. S. Vanick, International Nickel Co., New York; co-chairman, T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa.

2 p.m.—*Gating and Risering of Gray Iron*—Research Progress Report—W. A. Schmidt and H. F. Taylor, Massachusetts Institute of Technology, Cambridge

2:35 p.m.—*Gating and Risering Terminology*—Committee Report—N. A. Birch, National Bearing Div., American Brake Shoe Co., Meadville, Pa.

Foundry Show

TO DISPLAY NEWEST IN EQUIPMENT, SUPPLIES

WITH all exhibits located on one floor in Atlantic City's spacious Convention Hall, foundrymen will be given an exceptional opportunity to see the magnitude, brilliance and diversity of equipment and supplies on display at the 1952 AFS Foundry Show. Judging from the number of exhibitors and the amount of floor space to be occupied, the show will be one of the largest in the history of the society.

Reports indicate that considerable new equipment will be shown for the first time and that many companies have made improvements and refinements in machines and materials since the last exhibit two years ago.

A possible record attendance from all sections of the country will be augmented on Sunday, May 4, when foundry workers in the Chesapeake, Philadelphia and Metropolitan chapter areas will be admitted to the show. Free tickets for that day are being distributed through the individual foundries by committees of the three chapters.

The Foundry Show will be open from 9:30 a.m. to 5:30 p.m. on Thursday, May 1; from 9 a.m. to 9:30 p.m. on Friday; from 12 noon to 5:30 p.m. on Saturday; from 10 a.m. to 6:30 p.m. on Sunday; from 9 a.m. to 5:30 p.m. on Monday; from 9 a.m. to 5:30 p.m. on Tuesday and from 9 a.m. to 4 p.m. Wednesday.

A list of exhibitors corrected to April 11, follows:

LIST OF EXHIBITORS

	Booth No.
Accurate Match Plate Co. Inc., Chicago	1447
Adams Co., Dubuque, Iowa	1647
Advance Glove Mfg. Co., Detroit	206
Aerodyne Development Corp., Cleveland	1849
Air Reduction Sales Co., New York	334-36
Ajax Electrothermic Corp., Trenton, N. J.	1622-24
Ajax Engineering Corp., Trenton, N. J.	1622-24
Ajax Flexible Coupling Co. Inc., Westfield, N. Y.	1547
Ajax Metal Division, H. Kramer & Co., Philadelphia	610-12
Allis-Chalmers Mfg. Co., Milwaukee	1226
Alloy Metal Abrasive Co., Ann Arbor, Mich.	302
Alpha-Lux Co. Inc., New York	812
American Air Filter Co. Inc., Louisville	1550
American Clay Forming Co., Tiffin, O.	305
American Colloid Co., Chicago	210-212
American Fire Clay & Products Co., Canfield, O.	229
American Gas Association, New York	1424
American Lava Corp., Chattanooga, Tenn.	340
American Metal Market, New York	604
American Refractories & Crucible Corp., North Haven, Conn.	711
American Silica Sand Co., Ottawa, Ill.	904
American Steel Abrasive Co., Galion, O.	1446
American Wheelabrator & Equipment Corp., Mishawaka, Ind.	1817-18-19-20
Apex Smelting Co., Chicago	313
Archer-Daniels-Midland Co., Cleveland	1644-46
Asbury Graphite Mills Inc., Asbury, N. J.	502
Ayers Mineral Co., Zanesville, O.	222
Bakelite Co., Division of Union Carbide & Carbon Corp., New York	1229-31-33
Baroid Sales Division, National Lead Co., Chicago	504
C. O. Bartlett & Snow Co., Cleveland	1621
Bay State Abrasive Products Co., Westboro, Mass.	1551
Beardsley & Piper Division, Pettibone Mulliken Corp. (Champion Foundry & Machine Co., Johnston & Jennings Co.), Chicago	Stage
Black, Sivalls & Bryson Inc., Kansas City, Mo.	224
Blaw-Knox Division, Blaw-Knox Co., Pittsburgh	1717
Bloomsbury Graphite Co., Bloomsbury, N. J.	411
Borden Co., Chemical Division, New York	1828-30
Buckeye Tools Corp., Dayton, O.	1448-50
Campbell-Hausfeld Co., Harrison, O.	405-07
Canton Chaplet & Mfg. Co., Canton, O.	1209-11
Carborundum Co., Niagara Falls, N. Y.	1218-20
Chain Belt Co., Milwaukee	1625
Chicago Pneumatic Tool Co., New York	1104
Clearfield Machine Co., Clearfield, Pa.	1740

Convention Hall, site of the Foundry Show and headquarters for the International Congress

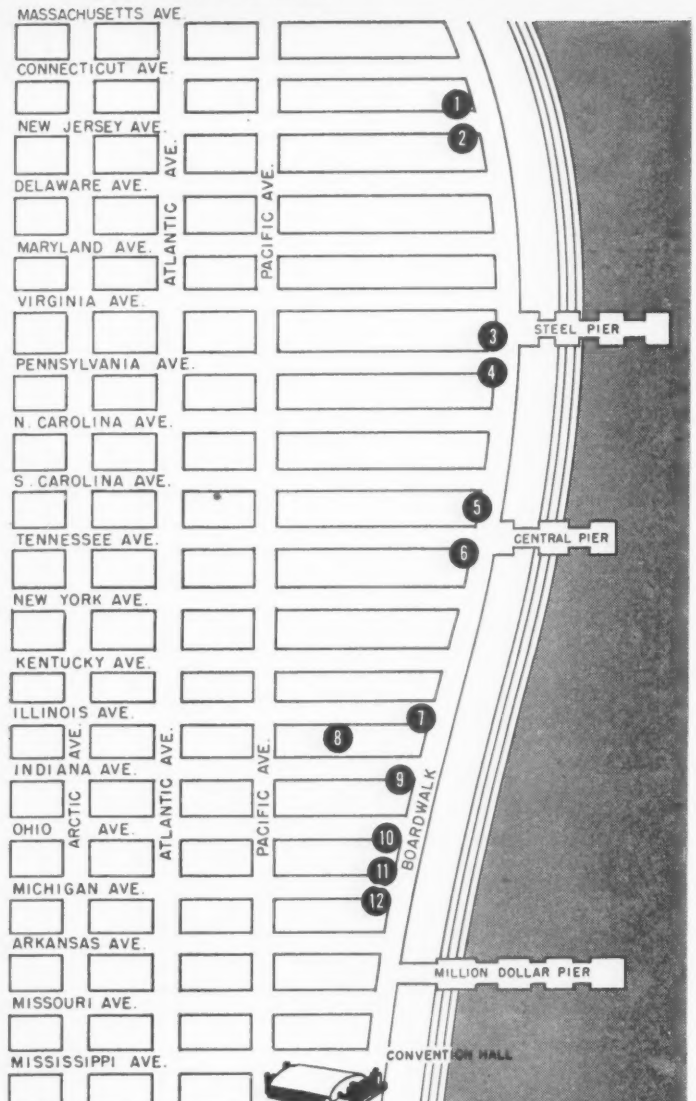
Cleco Division, Reed Roller Bit Co., Houston, Tex. 601-03-05
Cleveland Flux Co., Cleveland 801-05
Cleveland Metal Abrasive Co., Cleveland 1223
Cleveland Vibrator Co., Cleveland 1007
Climax Molybdenum Co., New York 1619
L. A. Cohn & Bro. Inc., Chicago 409
Colonial Smelting & Refining Co. Inc., Columbia, Pa. 228
Combined Supply & Equipment Co. Inc., Buffalo 207
Connecticut Coke Co., New Haven, Conn. 1222
Corn Products Sales Co., New York 902
G. & W. H. Corson Inc., Plymouth Meeting, Pa. 1802-04
Crane Co., Chicago 1134

Davenport Machine & Foundry Co., Davenport, Iowa 1449
Dayton Oil Co., Dayton, O. 321-23
Debevoise-Anderson Co. Inc., New York 908-10-12
Delaware Tool Steel Corp., Wilmington, Del. 1814
Delta Oil Products Co., Milwaukee 1443
Wm. Demmler & Bros., Kewanee, Ill. 1654
Despatch Oven Co., Minneapolis 1720
Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich. 1824-26
Detroit Sheet Metal Works, Detroit 1333
DeWalt Inc., Lancaster, Pa. 1854
Harry W. Dietert Co., Detroit 216-18-20
Dings Magnetic Separator Co., Milwaukee 304
Joseph Dixon Crucible Co., Jersey City, N. J. 1525
DoAll Co., Des Plaines, Ill. 1546
Dougherty Lumber Co., Cleveland 211
Dow Corning Corp., Midland, Mich. 1237
Durez Plastics & Chemicals Inc., North Tonawanda, N. Y. 230

Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago 1213-15
Eastern Gas & Fuel Association, Boston 1222
Eastman Kodak Co., Rochester, N. Y. 709
Econocast Inc., Chattanooga, Tenn. 1124
Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., New York 1630-40
Electro Refractories & Abrasives Corp., Buffalo 1435
Exomet Inc., Conneaut, O. 314-16
Exothermic Alloys Sales & Service Inc., Chicago 1114

Fabreeka Products Co., Boston 1336
Fanner Mfg. Co., Cleveland 1721
Federal Foundry Supply Co., Cleveland 1429-33
Federated Metals Division, American Smelting & Refining Co., New York 1736
FOUNDRY, Cleveland 1520

LOCATION OF HOTELS



Foundry Equipment Co., Cleveland 1321-23-25
Foundry Equipment Manufacturers' Association, Cleveland 1120
Foundry Facings Manufacturers' Association, Pittsburgh 114
Fox Grinders Inc., Pittsburgh 1112
Foxboro Co., Foxboro, Mass. 1346
Freeman Supply Co., Toledo, O. 1240
Fremont Flask Co., Fremont, O. 433

General Electric Co., Chemical Division, Pittsfield, Mass. 1723
General Electric Co., X-Ray Department, Milwaukee 606-08
General Grinding Wheel Corp., Philadelphia 808-10
General Refractories Co., Philadelphia 1239
Girdler Corp., Thermex Division, Louisville 1747
Globe Steel Abrasive Co., Mansfield, O. 1446
Gray Iron Founders' Society Inc., Cleveland 109-11
Great Lakes Carbon Corp., St. Louis 1224
Great Lakes Foundry Sand Co., Detroit 1317
Samuel Greenfield Co. Inc., Buffalo 237-39

Harbison-Walker Refractories Co., Pittsburgh 1649
Harnischfeger Corp., Milwaukee 1324-26
Benjamin Harris & Co., Chicago Heights, O. 1725
Harrison Abrasive Division, Metals Disintegrating Co. Inc., Manchester, N. H. 232
Harrison Machine Co., Erie, Pa. 1816
Hercules Powder Co., Wilmington, Del. 308-10
Herman Pneumatic Machine Co., Pittsburgh 1329
Hewitt-Robins Inc., New York 1648-50
Hickman, Williams & Co., Chicago 401-03
Hill & Griffith Co., Cincinnati 421-23
Hines Flask Co., Cleveland 1236
Frank G. Hough Co., Libertyville, Ill. 1730-1829
E. F. Houghton & Co., Philadelphia 701-03
Howard Foundry Co., Chicago 1248
Hydro-Blast Corp., Chicago 1217

Independent Pneumatic Tool Co., Aurora, Ill. 1201-03
Induction Heating Corp., Brooklyn, N. Y. 1219-21
Industrial Fabricating Inc., Eaton Rapids, Mich. 327
Industrial Minerals Co., Lancaster, O. 240
Ingersoll-Rand Co., New York 1821-23-25
International Graphite & Electrode Corp., St. Marys, Pa. 425-27
International Molding Machine Co., La Grange Park, Ill. 1339
International Nickel Co., Inc., New York 1420-22, 1521-23
Iron Age, New York 417-19
Iron Lung Ventilator Co., Cleveland 1617

Jarrell-Ash Co., Boston 337
Charles L. Jarvis Co., Middletown, Conn. 330
Jeffrey Mfg. Co., Columbus, O. 1744-46
William F. Jobbins Inc., Aurora, Ill. 333
Johnson-March Corp., Philadelphia 329
Joy Mfg. Co., Pittsburgh 1003-05
Kelley-Koett Mfg. Co., Covington, Ky. 1205-07
Kindt-Collins Co., Cleveland 1330
Andrew King, Narberth, Pa. 325
Lester B. Knight & Associates Inc., Chicago 1524
H. Kramer & Co., Chicago 610-12
Chas. A. Krause Milling Co., Milwaukee 1808-10
Kwik-Mix Co., Milwaukee 208

Laclede-Christy Co., St. Louis 1802-04
Lava Crucible Co. of Pittsburgh, Pittsburgh 512
R. Lavin & Sons Inc., Chicago 1838-40
Lindberg Engineering Co., Fisher Furnace Division, Chicago 1340-1439
Linde Air Products Co., New York 1630-40

LIST OF EXHIBITORS

Link-Belt Co., Chicago 1343-45-47

Machine Design, Cleveland 1520
Macklin Co., Jackson, Mich. 413-15
MacLeod Co., Cincinnati 1235
Magee Brothers, Chicago 339
Manley Sand Co., Rockton, Ill. 1130
Martin Engineering Co., Kewanee, Ill. 1348
Master Pneumatic Tool Co. Inc., Cleveland 1753
Mathews Conveyor Co., Ellwood City, Pa. 1354-1453
Mechanical Handling Systems Inc., Detroit 335
Michigan Smelting & Refining Division of Bohn Aluminum & Brass Corp., Detroit 705-07
Milward Alloys Inc., Lockport, N. Y. 1812
Mine Safety Appliances Co., Pittsburgh 322
Modern Equipment Co., Port Washington, Wis. 710-809
Monk Tool Co., Geneva, Ill. 215
Monsanto Chemical Co., St. Louis 1839
Morrison Industries Inc., Cleveland 104
The Moulders' Friend, Dallas City, Ill. 1832-34-36
Mullite Refractories Co., Shelton, Conn. 328
Mystic Iron Works, Boston 1222

Nassau Smelting & Refining Co. Inc., Totenville, Staten Island, N. Y. 317-19
National Carbon Co., New York 1630-40
National Crucible Co., Philadelphia 204
National Engineering Co., Chicago 1318-20-22, 1417-19-21
National Foundry Association, Chicago 113
National Pigment Co., Philadelphia 214
National Pulverizing Co., Millville, N. J. 439
New England Coke Co., Boston 1222
New Equipment Digest, Cleveland 1520
New Jersey Silica Sand Co., Millville, N. J. 1726
Newaygo Engineering Co., Newaygo, Mich. 1230-34
Niagara Falls Smelting & Refining Division, Continental Copper & Steel Industries Inc., Buffalo 602
Wm. H. Nicholls Co. Inc., Richmond Hill, N. Y. 1843-45-47
Nichols Engineering & Research Corp., New York 202
Non-Ferrous Founders' Society, Chicago 108-10
North American Smelting Co., Wilmington, Del. 1244
Norton Co., Worcester, Mass. 1423-25

S. Obermayer Co., Chicago 1522
Ohio Crankshaft Co., Cleveland 1750
Ohio Ferro-Alloys Corp., Canton, O. 227
Oliver Machinery Co., Grand Rapids, Mich. 1856-58
Osborn Mfg. Co., Cleveland 1754-1853

Pangborn Corp., Hagerstown, Md. 1729-39
Pekay Machine & Engineering Co., Chicago 201-03-05
Peninsular Grinding Wheel Co., Detroit 706
Pittsburgh Crushed Steel Co., Pittsburgh 1446
Pennsylvania Glass Sand Corp., Pittsburgh 234
Pennsylvania Pulverizing Co., Pittsburgh 234
Penola Oil Co., Detroit 1225-27
Penton Publishing Co., Cleveland 1520
George F. Pettinos Inc., Philadelphia 1416
Philadelphia Coke Co., Philadelphia 1222
Picker X-Ray Corp., White Plains, N. Y. 101-03
Pittsburgh Crushed Steel Co. and Subsidiaries, Pittsburgh 1446
Pittsburgh Lectromelt Furnace Corp., Pittsburgh 1344
Precision Grinding Wheel Co. Inc., Philadelphia 1334
Pressure Match Plate Co. Inc., Philadelphia 315
Pyro Refractories Co., Oak Hill, O. 226
Pyrometer Instrument Co. Inc., Bergenfield, N. J. 611

Ready-Power Co., Detroit 1001
Reda Pump Co., Bartlesville, Okla. 1118
Redford Iron & Equipment Co., Detroit 1745
W. G. Reichert Engineering Co., Newark, N. J. 318-20
Republic Coal & Coke Co., Chicago 332
H. H. Robertson Co., Pittsburgh 301-03
Robinson Clay Product Co., Akron, O. 338
Ross-Tacony Crucible Co., Philadelphia 331
Royer Foundry & Machine Co., Kingston, Pa. 1243-51

Safety Clothing & Equipment Co., Cleveland 905-07
Safety First Shoe Co., Holliston, Mass. 307
Safety-Sling Products Co., Detroit 1418
George Sall Metals Co. Inc., Philadelphia 306
Claude B. Schneible Co., Detroit 1254-1353
A. Schrader's Son Division, Scovill Mfg. Co., Brooklyn, N. Y. 1722
Schramm Inc., West Chester, Pa. 1255-57
Scientific Cast Products Corp., Cleveland 429-31
Semet-Solvay Division, Allied Chemical & Dye Corp., New York 508-10
Severance Tool Industries Inc., Saginaw, Mich. 906
Simonds Abrasive Co., Philadelphia 324-26
Simplicity Engineering Co., Durand, Mich. 1335
Smith Oil & Refining Co., Rockford, Ill. 236-38
Smith & Richardson Mfg. Co., Geneva, Ill. 215
Solvay Sales Division, Allied Chemical & Dye Corp., New York 312
Spencer Turbine Co., Hartford, Conn. 909-11
SPO Inc., Cleveland 1108
Springfield Facing Co., Harrison, N. J. 609
Stamford Engineering Works, Bamber Foundry Inc., Stamford, Conn. 1250
Standard Conveyor Co., North St. Paul, Minn. 1128
Standard Electrical Tool Co., Cincinnati 1009-11
Standard Horse Nail Corp., New Brighton, Pa. 901
States Engineering Corp., Fort Wayne, Ind. 1833
Steel, Cleveland 1520
Steel Shot & Grit Co. Inc., Boston 1446
Steel Shot Producers Inc., Butler, Pa. 903
Sterling Wheelbarrow Co., Milwaukee 1618
Frederic B. Stevens Inc., Detroit 1718
Stewart-Warner Corp., Alemite Division, Chicago 1748
Sutter Products Co., Dearborn, Mich. 1350
Swan-Finch Oil Corp., New York 1623

Tabor Mfg. Co., Philadelphia 1743
Taggart Brimfield Co., Hammonton, N. J. 804-06
G. H. Tennant Co., Minneapolis 233-35
Thiem Products Inc., Milwaukee 1349
Tincher Products Co., Sycamore, Ill. 231
Titanium Alloy Mfg. Division, National Lead Co., New York 1445
Toledo Scale Co., Toledo, O. 1319

Union Carbide & Carbon Corp., New York 1630-40
United Oil Mfg. Co., Erie, Pa. 1651
United States Graphite Co., Saginaw, Mich. 1626
United States Gypsum Co., Chicago 435-37
United States Reduction Co., East Chicago, Ind. 1806
United States Rubber Co., Mechanical Goods Division, New York 1241
Vanadium Corp. of America, New York 1620
Vesuvius Crucible Co., Swissvale, Pa. 802
Vonnegut Moulder Corp., Indianapolis 1860
Westover Engineers, Nomad Foundry Equipment Division, Milwaukee 607
White Pine Lumber Co., Chicago 1138
Whitehead Bros. Co., New York 702
Whiting Corp., Harvey, Ill. 1842-52
Winter Engineering Corp., Buffalo 106
Zanesville Sand Co., Zanesville, O. 240

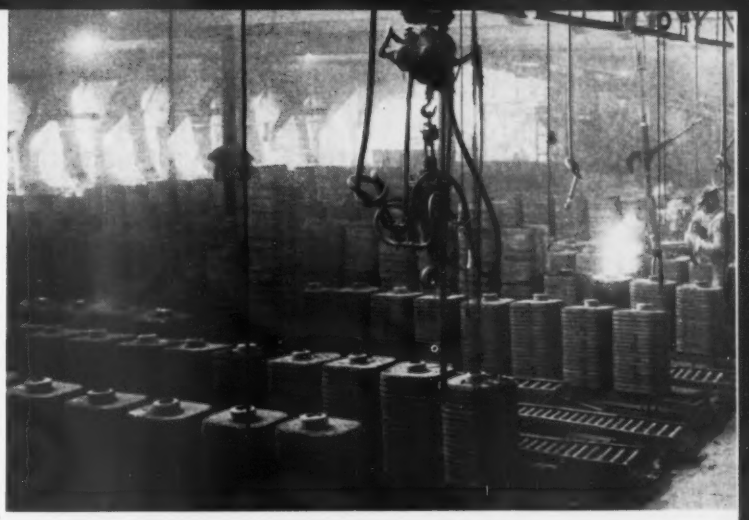
International FOUNDRY CONGRESS and Show

Plant Inspection

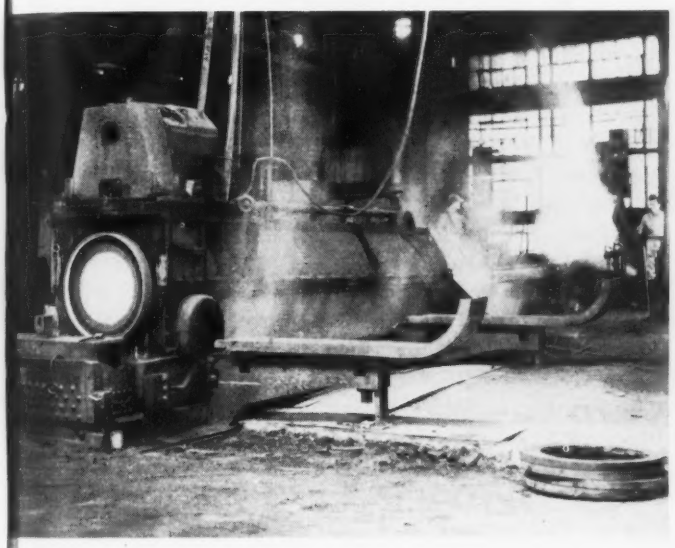
Plant	Products	Availability
ATLANTIC STEEL CASTINGS CO. Chester, Pa.	Steel jobbing foundry. Marine, railroad and industrial castings, 10-10,000 lb.	May 2, 6 A.M. and P.M.
BUDD CO. Red Lion Plant, Philadelphia	Gray iron highly mechanized foundry. Automotive brake drums.	May 2, 5, 6, 7 A.M. and P.M.
CROWN NON-FERROUS FOUNDRY, INC. Chester, Pa.	Brass and bronze, babbit metal. Marine and heavy machinery castings.	May 2, 5, 6, 7 A.M. and P.M.
CRUCIBLE STEEL CASTINGS CO. Lansdowne, Pa.	Steel semi-mechanized jobbing foundry. Carbon and alloy electric furnace steel.	May 2, 5, 6, 7 9:30-12 A.M.
DODGE STEEL CO. Philadelphia	Steel jobbing foundry, Carbon and low-alloy castings, average weight 20 lb. Acid electric furnaces.	May 2, 6 A.M. and P.M. (20 limit)
EASTERN MALLEABLE IRON CO. Wilmington, Del.	Pearlitic malleable, carbon steel. Heavy-duty truck castings. Air furnace and converter melting, electric furnace and radiant tube annealing.	May 2, 5, 6, 7 —3:30 P.M.
H. G. ENDERLEIN CO. Philadelphia	Gray iron jobbing foundry, Castings to 3 tons.	May 2, 5, 6, 7 A.M. and P.M.
FLORENCE PIPE FOUNDRY & MACHINE CO. Florence, N. J.	Gray iron. Sand spun and centrifugally cast iron pipe: 4-10 in. diam., 16 ft. length; 12-30 in., 16 & 20 ft. length. Also general castings 2-25,000 lb.	May 2 1:30-3:30 P.M. (100 limit)
OLNEY FOUNDRY — LINK-BELT CO. Philadelphia	Gray iron mechanized jobbing foundry. Speed reducers, conveying machinery, power transmission, machine tools, pumps, textile machinery, automotive dies, etc. Castings up to 10,000 lb.	May 2, 6, 7 A. M. and P.M. (100 limit per day)
PALMYRA FOUNDRY CO. Palmyra, N. J.	Gray iron, white iron, Ni-Hard. General jobbing foundry. Paper machinery, machine tools, dredging equipment, pumps, valves, etc. Castings up to 10,000 lb.	May 2, 5, 6, 7 2-3:30 P.M.
PHILADELPHIA BRONZE & BRASS CORP. Philadelphia	Brass and bronze jobbing foundry. Castings up to 800 lb, wide range of alloys, sizes.	May 5, 6, 7 10 A.M.-2 P.M.
PHILADELPHIA COKE CO. Philadelphia	Producers of foundry, industrial and domestic coke.	May 2, 5, 6, 7 A.M. and P.M.
PHILADELPHIA NAVAL SHIPYARD Philadelphia	Gray iron, steel, brass & bronze, aluminum. Iron capacity 100 tons daily, up to 35 tons. Steel capacity 25 tons daily, up to 16 tons. Nonferrous capacity 82 tons daily, up to 50 tons.	May 2,3,5,6,7 1:00-3:30 P.M. (Note: Subject to special clearance on alien visitors)
SALEM PIPE & IRON MFG. CO. Bridgeton, N. J.	Gray iron soil pipe and fittings.	May 2, 5, 6, 7 A.M.
UNITED STATES PIPE & FOUNDRY CO. Burlington, N. J.	Gray iron. Centrifugal cast iron pipe in metal molds, fittings in green sand, dry sand and loam.	May 2 A.M. (100 limit)
WELSBACH CORP. Philadelphia	Brass and bronze modern foundry.	May 2, 5, 6, 7 A.M.
WILKENING MFG. CO. Philadelphia	Gray iron production foundry. Piston ring castings.	May 6 10 A.M.-2 P.M.
WILLIAMSTOWN FOUNDRY CORP. Williamstown, N. J.	Gray iron soil pipe and fittings.	May 2, 5, 6, 7 A.M. and P.M.

NUMEROUS foundries in the Philadelphia area will be open for inspection by visitors to the International Foundry Congress at Atlantic City. Arrangements for visits to these plants have been made by a special committee of the Philadelphia Chapter of the American Foundrymen's Society.

The accompanying schedule lists the foundries on the visitation schedule and the time at which visits may be made. A wide variety of ferrous and nonferrous jobbing and production foundry operations may be viewed at these plants on most days of convention week. In addition, a number of New Jersey sand producing plants will welcome visitors. (*Please turn to page* 194)

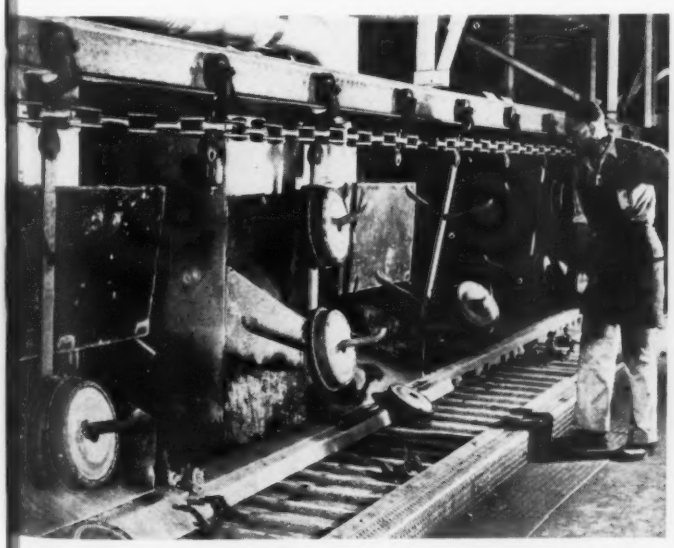


Foundry pouring floor of Wilkening Mfg. Co., Philadelphia, a manufacturer of piston rings

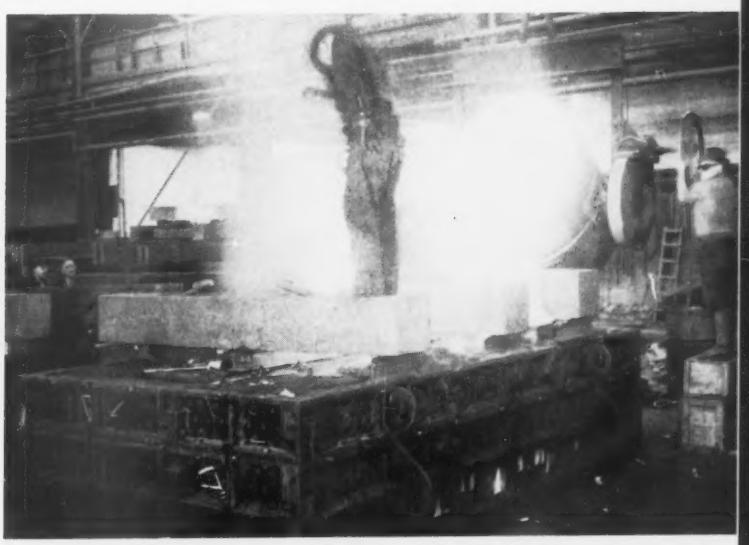


Casting iron pipe centrifugally at Burlington, N. J., plant of United States Pipe & Foundry Co.

Special mold conveyor cars are used at Olney Foundry Division, Link-Belt Co., Philadelphia



Transferring brake drum castings from two shakeout screens to trolley conveyor at the Budd Co.'s new Red Lion production foundry near Philadelphia



Pouring cast iron bed plate at the Philadelphia Naval Shipyard. The yard foundry also produces a variety of steel, brass and bronze castings

ALBERT PORTEVIN
Joseph S. Seaman Medalist

ALBERT PORTEVIN, distinguished French physical metallurgist, will receive the Joseph S. Seaman Medal of the AFS at Atlantic City "for technical contributions over many years to the arts and sciences of the foundry industry." Professor Portevin was born in Paris in 1880. He was graduated from the Ecole Central des Arts et Manufactures, Paris, in 1902, and from 1905 to 1912 was director of the laboratories of de Dion-Bouton Motor Works. For 13 years he was associated with the Ecole Centrale des Arts et Manufactures, first as lecturer and in charge of the laboratory of metallography, and later as professor. He then became director of Ecole Superieure de Fonderie, Paris, and in addition held the chair of metallurgy. In 1931 he also became professor at the Ecole Superieure de Soudure Autogene, Paris, and became associated with *Revue de Metallurgie* of which he is technical director of the editorial board. Professor Portevin's work has been on physical metallurgy, particularly of steels, but he also developed micrographic methods for the study of nonferrous alloys comparable with those used for steel. He has been active with many Continental technical societies. He is a Carnegie and Bessemer medalist of the Iron and Steel Institute, has received the Platinum Medal of the Institute of Metals—both of Britain—and is honorary president of the Association Technique de Fonderie of France.

FRANK G. STEINEBACH
John A. Penton Medalist

FRANK G. STEINEBACH, editor of FOUNDRY, and vice president and secretary of the Penton Publishing Co., Cleveland, will receive the John A. Penton Medal of AFS "for outstanding contributions to the foundry industry and the society." Mr. Steinebach joined the Penton company shortly after graduation from Purdue University in 1922 with a degree in electrical engineering. He became a member of the editorial staff of FOUNDRY in 1924, was made associate editor in 1926, managing editor in 1929 and editor in 1936. He has been secretary of the company since 1937 and

HENTON MORROGH
William H. McFadden Medalist

ALBERT P. GAGNEBIN
Peter L. Simpson Medalist

Eight men will be honored during the International Foundry Congress in the presentation of annual awards by the American Foundrymen's Society. The AFS Board of Awards has selected five recipients for gold medals and three for honorary life membership in the society. Presentations will be made at the annual banquet in Atlantic City, May 3. On the same occasion the annual Award of Honor of the International Committee of Foundry Technical Associations will be presented to an individual yet to be announced

SERVICE TO INDUSTRY RECOGNIZED IN

AFS AWARDS

was elected a vice president in 1944. During World War II, Mr. Steinebach served for a year as chief, Foundry Equipment and Supplies Section, Tools Division, War Production Board, Washington. Because he believed that co-operative action among the various foundry organizations would be of great benefit to the castings industry, especially in its dealings with government, he did much to encourage the formation of the National Castings Council, and has served as its secretary since it was created in 1946. He took an active part in getting the Munitions Board to recognize the industry, and served as chairman of the Foundry Industry Advisory Committee of that board for several years. His AFS activities have included service as chairman of the International Relations Committee, chairman of the joint Committee on Foundry Education in Enginering Schools and president of the Northeastern Ohio Chapter in 1936-37.

KEITH D. MILLIS
Peter L. Simpson Medalist

HENTON MORROGH, research manager, British Cast Iron Research Association, has been selected to receive the William H. McFadden Medal "for outstanding work and development in the field of spheroidal cast iron." Mr. Morrogh joined the research association in 1933 when he was 16 years of age, working first in the metallographic department. In 1942 he was appointed senior research officer and in 1945 became research manager. The Iron and Steel Institute honored Mr. Morrogh with the award of the Andrew Carnegie Medal in 1947, and in 1951 he received the E. J. Fox Medal of the Institute of British Foundrymen in recognition of his contributions to research on cast iron over a period of years. Mr. Morrogh's work on nodular iron first attracted wide attention in this country in 1948 when he presented a paper on "The Production of Nodular Graphite Structure in Gray Cast Iron" before the 52nd annual meeting of the AFS in Philadelphia.

ALBERT P. GAGNEBIN, a member of the Development and Research Division of the International Nickel Co. Inc., New York, has been named jointly with K. D. Millis to receive the Peter L. Simpson Memorial Medal "for outstanding work and development in the field of spheroidal cast iron." Mr. Gagnebin was graduated from Yale University in 1930 and was awarded the degree of Master of Science in Metallurgy in 1932. He joined the International Nickel Co. and was employed in its research laboratories at Bayonne, N. J., conducting research on ferrous metals. Fundamental studies were made on the solidification characteristics of irons over an extended period which subsequently led to the development of nodular graphite cast iron. He has been associated with the New York office of the company since 1949.

KEITH D. MILLIS, associated with the Development and Research Division of the International Nickel Co., New York, and co-recipient of the Peter L. Simpson Memorial Medal with Mr. Gagnebin, is a graduate of the Rensselaer Polytechnic Institute and received

Life Members

WILLIAM G. MIXER

A. I. KRYNITSKY

WALTER L. SEELBACH

the degree of Master of Metallurgical Engineering from that school in 1939. He then joined the staff of the International Nickel Co.'s research laboratory in Bayonne, N. J., where he conducted research on nonferrous cast materials. He later devoted his attention to the problems concerned with the metallurgy of high-carbon irons, and extensive research on the graphitization and solidification of those irons led to the development of nodular graphite cast iron.

WILLIAM G. MIXER, Pontiac, Mich., for the last several years a consultant specializing in production foundry problems, has been named a recipient of a life membership in the American Foundrymen's Society in recognition of "a lifetime of service and application of engineering to the foundry industry." Mr. Mixer was graduated from Stevens Institute of Technology, Hoboken, N. J. He was associated with the Buick Motor Division of the General Motors Corp. for 29 years and was appointed its foundry superintendent at Flint, Mich., in 1941. Stevens Institute awarded Mr. Mixer its Merit Medal in 1945 for his successful operation of the Buick aluminum foundry during World War II. Mr. Mixer was retired from the Buick Division in 1949 and lately has engaged in consulting work.

A. I. KRYNITSKY, who recently retired from the National Bureau of Standards, Washington, has been chosen to receive a life membership in the society "for a lifetime of fundamental research in the field of metal casting." Mr. Krynitsky was born in Russia in 1880 and studied metallurgy at the Michael Artillery College and Academy, St. Petersburg, under the noted Russian authority, Prof. D. K. Tchernoff. He served as superintendent of the metallurgical department of the government time fuze plant in St. Petersburg from 1907 to 1915, and for the next three years was chief inspector of time fuzes ordered by the Russian government from the United States. In the United States at the time of the Russian revolution, Mr. Krynitsky remained here and was continuously associated with the National Bureau of Standards from 1918 until his retirement. At the close of his tenure of service he was chief of the bureau's experimental foundry at Washington.

WALTER L. SEELBACH, president of Superior Foundry Inc., Cleveland, will receive an honorary life membership as retiring president of the society. He has been active in the foundry industry since his graduation from Case Institute of Technology, Cleveland, in 1910 with a degree in civil engineering. Mr. Seelbach was associated with the Forest City Foundries Co., Cleveland, serving as secretary-treasurer and vice president. He resigned from that company in 1946 to become president of Superior Foundry. Mr. Seelbach has served two terms as president of the Gray Iron Founders' Society and was one of the organizers of the Gray Iron Institute, its predecessor organization. He also has been chairman of the Case Institute Advisory Committee of the Foundry Educational Foundation, and is a member of the Gray Iron Industry Advisory Committee to the National Production Authority, Washington.

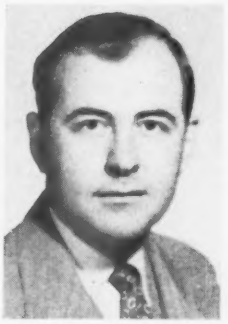
ARNOLD N. KRAFT

GEORGE H. BRADSHAW

CHESTER V. NASS

R. V. HUNTER

CHARLES W. MOONEY



HOWARD VOIT

W. O. BECKER

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Beardsley & Piper Division of
Pettibone Mull.ken Corp., Chicago

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WILLIAM F. GRADEN
Simonds Abrasive Co., Philadelphia

MANNY ENDERLEIN
H. G. Enderlein Co., Philadelphia

ROBERT CARRIGAN
North American Smelting Co., Wilmington, Del.

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Hickman, Williams & Co., Philadelphia

J. L. FUREY
Taggart Brimfield Co., Hammonton, N. J.

ALLAN M. JOHNSON
Debevoise-Anderson Co., Philadelphia

STANLEY C. BENTLEY
Crucible Steel Casting Co., Lansdowne, Pa.

W. D. BRYDEN
Philadelphia Bronze & Brass Corp., Philadelphia

H. W. STUART
U. S. Pipe & Foundry Co., Burlington, N. J.

WARREN A. BROWN
Florence Pipe Foundry & Machine Co., Florence, N. J.

J. HARVEY JOHNSTON
General Steel Castings Corp., Eddystone, Pa.

EDWARD BERRY
Dodge Steel Co., Philadelphia

C. B. SOMERS
Whitehead Bros. Co., New York

HERMAN E. MANDEL
Pennsylvania Foundry Supply & Sand Co., Philadelphia

GEORGE H. BRADSHAW
Philadelphia Naval Shipyard, Philadelphia

KENNETH E. DAVIS

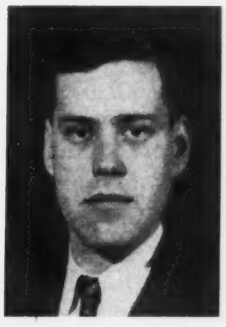
WILLIAM F. GRADEN

A. E. ST. JOHN

STANLEY C. BENTLEY

DANIEL J. JONES

MRS. ALFRED A. DIEBOLD



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By W. C. NEWHAMS
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Magnesium

SAND FOUNDRY

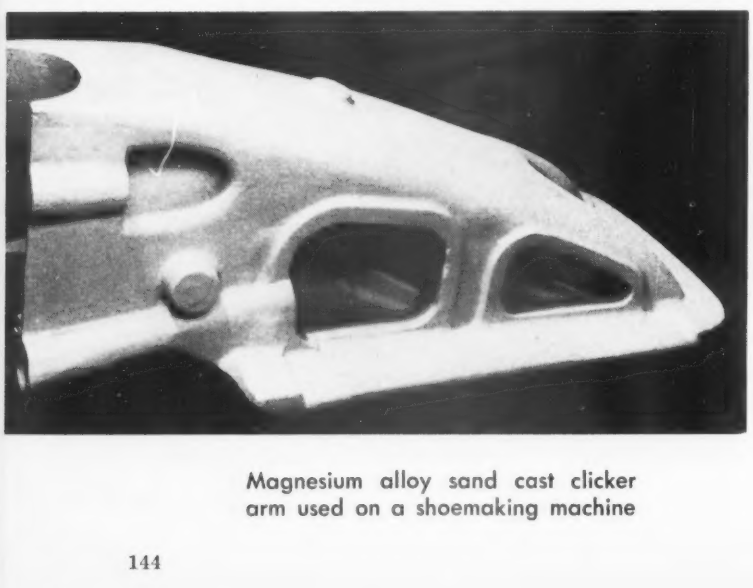
Increased interest in magnesium sand casting practice has accompanied expansion in demand for magnesium castings, particularly in connection with the defense program. The author reviews developments in the industry since World War II, offering recommendations on melting, molding, gating and risering, and correction of defects

THE recent increase in demand for magnesium sand castings has developed a corresponding increase of interest in magnesium foundry practices. Numerous articles on the subject were published during World War II, but developments in the intervening years are of sufficient importance to justify a review of the procedures currently employed. Descriptions of techniques essential to the production of castings of good quality will be supplemented by discussion of the metallurgical considerations involved.

Comments on foundry practices will be confined to those established for the standard magnesium-aluminum-zinc alloys, since they are of greatest commercial importance on the basis of production volume.

The newer alloys of magnesium containing zirconium and rare earths require somewhat different techniques in preparing them for castings. The practices employed with these alloys are not fully developed, and changes and improvements are being made frequently. Techniques employed with the zirconium and rare earth containing alloys are the subject of several recent papers and will therefore not be discussed here.

The production of magnesium alloy sand castings presents some problems not encountered in casting other metals. These problems are predominantly associated with the comparatively high reactivity of magnesium in the finely divided or molten state. However, adoption of suitable procedures has permitted magnesium foundries to produce good quality castings for the large and complicated parts demanded by aircraft and other industries.



Magnesium alloy sand cast clicker arm used on a shoemaking machine

To produce high-quality magnesium alloy castings with fine grain size and free from metallic and nonmetallic inclusions, it is necessary to establish and adhere to good procedure in the melting, molding, coremaking and related departments of the foundry. Faulty techniques in any one department can nullify the good practices in all other departments by producing scrap castings.

Melting—Magnesium alloys are usually prepared for casting by melting in tilting type crucible furnaces of 1200-2000 pounds capacity. The metal is then transferred to smaller crucibles for refining and pouring. The smaller crucibles vary in capacity from 75 to 750 pounds. In smaller foundries it is often found more convenient to perform all the metal preparation operations in the same crucible used for pouring the castings.

The crucibles are made of welded low-carbon steel. Wall thickness varies from ¼-in. for the smallest crucible to 1⅝-in. walls and 2-in. thick bottoms for the 2000-pound capacity crucibles. Metallizing the crucibles with aluminum will retard scaling of the steel and increase their useful life. Where metal requirements are very large, reverberatory type furnaces may be used for melting magnesium alloys, but as far as is known no such furnaces are being used by magnesium foundries.

The charge to the melting furnace will usually con-

Setting cores in a green sand mold to produce a magnesium alloy sand casting

sist of foundry operating scrap, primary or secondary ingot, reclaimed scrap or purchased scrap if of known analysis and free from contaminants such as sand, oil, grease, etc. The proportion of these materials should be adjusted to maintain a fairly constant volume of operating scrap. If melts consisting entirely of ingot are poured, difficulty with coarse grain may occur unless special precautions are followed. Metal reclaimed from pouring box skulls, from turnings and from other dirty scrap should be used in limited quantities only, to decrease the danger of off-composition, gassy or dirty melts.

The charge should be melted and heated to 1275°F, using flux as necessary to prevent the metal from burning. If aluminum, magnesium or zinc is required to correct the analysis of the alloy, the addition should be made at this time. An alloying basket or hand puddler should be used to prevent the aluminum or zinc from sinking into the flux in the bottom of the crucible before the alloying is completed. After the addition, the metal is stirred to insure a homogeneous melt. The metal melted in the tilting furnace is transferred at this time to smaller crucibles and degassed, flux refined, and treated for grain refining before pouring.

Fluxing the Melt—The greatest difference between the melting practice for magnesium alloys and that for other common metals is the need for employing flux when melting and treating magnesium alloys. The purposes of the fluxes used with magnesium are to protect the metal from burning and to clean the metal of nonmetallic impurities.

Two fluxes commonly are used in the preparation of magnesium alloys in the foundry. Dow No. 230 flux, used in the melting furnace, is for protection against burning and oxidation only. This flux melts at a lower temperature than the alloy and remains fluid while the metal is held molten. Density of the

flux is slightly higher than that of the common alloys, which allows most of the flux to remain in the bottom of the crucible. The surface tension between the flux and melt is sufficiently high to maintain a film of fluid flux on the surface and exclude atmospheric oxygen.

If Dow No. 230 flux is used in crucibles from which castings are to be poured, the castings are very likely to contain chloride inclusions which will cause accelerated local corrosion at the spot containing the chloride. Dow flux No. 310 is preferred for protection when melting in the same crucible from which castings are to be poured and in the pouring crucible when molten metal is transferred from the melting furnace. No. 310 flux melts when it is added to molten metal and forms a thin liquid layer of flux over the surface. Approximately five minutes after the flux is added, it dries to form a hard protective crust. This crust can be skimmed back or removed easily when the metal is ready to be poured.

The refining operation with Dow No. 310 flux is also efficient in removing nonmetallic impurities from the metal. For this purpose the metal in the pouring crucible is heated to 1320 to 1350°F and a layer of the flux sprinkled over the surface. When the flux melts, a hand or mechanical stirrer is used to impart a swirling motion to the metal. The speed of stirring should not be so vigorous as to form a vortex, else air will be sucked into the metal and increase the oxide content. No. 310 flux should be added gradually while stirring and the stirring continued until the surface appears clean and lustrous. At this time the excess flux and oxide should be skimmed from the surface and a fresh coating of flux applied.

For melts that are to be degassed with chlorine in the pouring crucible, the flux refining operation may be eliminated since the magnesium chloride formed during this operation is washed through the melt and efficiently cleans the metal of oxide inclusions. A holding period of at least five minutes after the last addition of flux is required to insure proper drying of the flux. If the flux does not have sufficient time

to dry, flux inclusions may be found in the casting.

After the flux is removed from the melt in preparation for pouring or at any other time when the use of flux for protection is undesirable, burning of the metal can be controlled by dusting with a mixture of sulphur, boric acid and ammonium fluoborate.

Gas Porosity—Gas porosity may occur in magnesium castings if certain precautions are not observed in metal preparation and melting. In magnesium alloys gas porosity usually takes the form of microporosity rather than pinhole porosity or large voids. Gas porosity in magnesium alloys results from hydrogen gas which is soluble in the molten metal and liberated during the freezing process to cause microscopic voids in the casting.

The principal source of hydrogen is moisture coming in contact with molten magnesium alloys. The moisture may be in the form of hydrated magnesium salts on scrap or ingots charged to the melting furnaces or on tools and equipment used in the melting process. Since the melting and refining fluxes used with magnesium alloys are hygroscopic, they are an additional source of moisture. Care should be exercised at all times to keep the flux as dry as possible and to use it in such a manner that it is not submerged under the metal surface until it has become molten. Oil or grease on scrap charged to the furnace is another source of hydrogen.

The prevention of gas pickup requires that all scrap or ingot charged to the melting furnaces be clean and dry and all tools and equipment be clean and hot enough to insure dryness.

It is especially important that crucibles being filled at the tilting furnaces be as clean as possible and hot enough to drive all moisture from flux or sludge on the bottom or side walls of the crucible. Scrap which may be contaminated with oil, grease or preservatives should be degreased before use in melts intended for castings.

The elimination of moisture, oil, grease, etc. from metal to be melted or tools which may come in contact with the molten metal is necessary for reasons of safety as well as of casting quality. Moisture on metal or tools brought into contact with molten magnesium may react with sufficient violence to eject metal from the crucibles. When degassing is a standard procedure at a later stage of the melting process, the observance of these precautions will decrease the time and cost of the degassing treatment.

The use of well designed and well placed gates, risers and chills to promote directional solidification may be sufficient to decrease the ill effects of dissolved gas, but the only positive method of eliminating gas porosity is to prevent the absorption of the hydrogen or to eliminate the gas by treating the molten metal to remove it.

Degassing—Several methods of removing hydrogen from molten magnesium have been developed. Treatment of melts with aluminum chloride, zinc chloride, or chlorinated hydrocarbons is practiced to a limited extent. Solidifying each melt in the crucible and remelting is a well known but time consuming method of reducing the hydrogen content. However, the most efficient and most widely used method involves bubbling dry nitrogen or chlorine through the molten metal. Use of chlorine requires adequate provisions for ventilation.

Using a band saw in the cleaning room to remove risers from a magnesium alloy casting

The degassing treatment is best performed just after the metal has been transferred from the melting crucible. If this is impossible or inconvenient, degassing may be performed in the melting crucible. The results when degassing in the melting crucible are not quite as good as when degassing in the pouring crucible, since the melt may absorb more hydrogen in the transferring and refining operations. The metal temperature should be controlled between 1320 and 1380°F during the treatment. Lower temperatures result in the formation of solid magnesium chloride, which does not protect the metal from burning. Higher temperatures result in a too rapid formation of liquid magnesium chloride, which increases the melting loss and the danger of flux inclusions in the castings.

The fluxing gas may be introduced through a carbon or graphite tube. The end of the tube must be held at a safe distance from the sides or bottom of the crucible to prevent a rapid localized attack of the steel by chlorine. A treatment of 5 to 15 minutes is recommended, depending upon the condition of the metal to be treated. The rate should be adjusted to the maximum flow that will not result in excessive agitation.

The mechanical properties of magnesium alloys are

Pouring a magnesium sand casting

closely related to the grain size of the metal. Fine grain material may be assured by following one of several established grain refining techniques.

One method of grain refining, and one which is still used to a considerable extent, is known as superheating. The metal is heated to some temperature between 1650 and 1750°F and held there for up to 15 minutes before cooling to the pouring temperature. The required holding temperatures and time period differ from plant to plant and usually vary with the alloy being treated. The metal should be cooled from the superheating to the pouring temperature and poured as rapidly as possible to obtain the best grain size, since grain size increases when the metal is held at temperatures lower than the superheating temperature.

A newer method of grain refining that is finding use in this country and abroad is carbon inoculation. A number of carbon-containing compounds such as lamp black, calcium carbide, carbon tetrachloride and chlorinated hydrocarbons may be employed with success. The treatment varies with the compound being used. Solid materials may be added at 1400-1450°F and the metal held for 10 minutes before pouring.

The control of impurities in magnesium alloys is dependent upon cleanliness in operation. Silicon is a major impurity in most foundries. Silicon is usually picked up from molding or core sand adhering to foundry scrap charged to the melting furnaces. To prevent this, all such scrap should be cleaned by sand blasting prior to remelting. Scrap castings with internal pockets should be sawed or broken open to aid in removing all core sand. Other causes of contamination are the mixing of other metals handled in the foundry and the introduction of inserts or bushings in purchased scrap.

Pouring Practice—As in the case with all other metals, the pouring practice for magnesium alloys is very important. The crucible must be removed from the furnace at a temperature sufficiently above the required pouring temperature to permit time for cleaning the metal surface. All the flux and oxide should be skimmed from the metal surface and removed from the crucible walls and pouring lip.

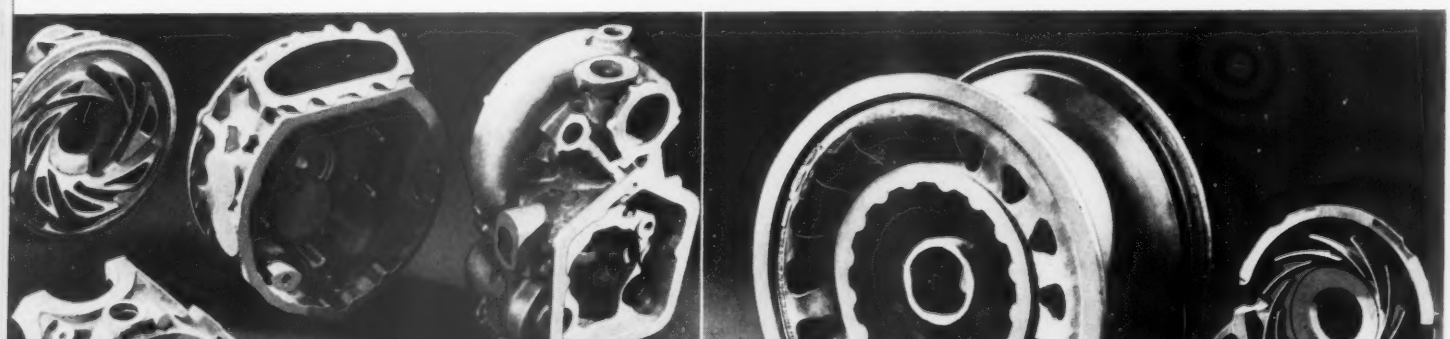
The correct pouring temperature is determined for each casting at the time the gating is established. It must be controlled closely thereafter to prevent misruns or excessive porosity in castings.

Pouring the casting is performed whenever possible with one crucible, but the best gating practice for some castings requires that two or more crucibles be used.

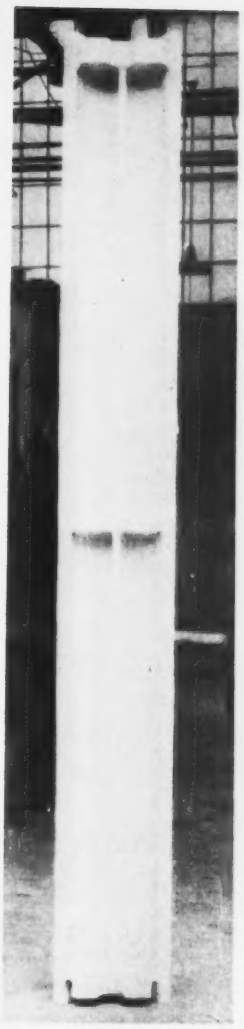
A pouring box is advisable for all castings. The metal stream should never be guided directly down the sprue. The metal should be poured rapidly at first to fill the pouring box and the rate then adjusted to keep the box full until the pour is completed. Maintaining the pouring rate as steady as possible and holding the crucible lip close to the pouring box will prevent excessive turbulence and the formation of oxide skins which can wash into the casting.

Having sufficient metal in the crucible so that a heel of at least 10 per cent can be retained when the mold is full, will aid in preventing flux inclusions.

Molding and Coremaking—Sand practice employed in the magnesium foundry differs from that with other metals. The difference is again due to the reactivity of the metal in the molten state. In the early days of the magnesium industry, it was thought that sand molds had to be completely free from water. Later developments have shown that if an inhibitor is mixed



Left—Magnesium sand castings for aircraft engines. Right—Typical magnesium aircraft sand castings



Left—Making cores for the production of magnesium alloy sand castings. *Right*—A large magnesium casting used in bag making

with the sand, sufficient water to properly temper the sand can be used.

The inhibitors in general use are sulphur, boric acid and diethylene glycol. Some foundries prefer to have a small amount of a fluoride which is volatile at the temperature of molten magnesium present for added protection. The amount of inhibitors maintained in the sand will vary depending upon the size and type of castings being poured. These inhibitors in the sand result in a large quantity of gas being formed in the mold cavity when the metal is poured. It is, therefore, necessary that an open sand with a high permeability be used.

To obtain the high permeability and low moisture content with other good sand properties, it is necessary to use a synthetic sand. The base sand is usually a washed silica or a bank sand with a grain size distribution that provides a permeability of 80 to 150 on the basis of AFS standards. The permeability needed in the sand depends upon the inhibitors used, the size of the castings produced and the surface finish required on the castings. With such an open sand, the presence of up to 2 per cent diethylene glycol is very desirable to slow down the rapid drying of the sand.

In all synthetic sand systems frequent mulling of the sand is desirable. New sand, bentonite and inhibitor to replace that which is burned out of the sand are usually added in the muller. Additions of the new sand and bentonite are made to maintain the molding sand properties within limits established by experience in the individual foundries.

It is very important in the magnesium foundry to keep the molding sand as clean as possible. Frequent screening of the sand is necessary to remove all debris likely to absorb moisture or which may itself react with the molten metal to produce blows in the castings.

Coreroom practice in the magnesium foundry differs only slightly from that used with other metals. The major difference is found again in the need for inhibitors in the core mix. Sulphur and boric acid are the usual inhibitors employed.

The most common core binder used in magnesium foundries is urea formaldehyde, which has substantially replaced the oil core binders in common use until approximately 1943. The urea-formaldehyde bonded cores have a hard surface and can be baked at 300°F which results in a much lower loss of inhibitor. The knock-out (*Please turn to page* 362)

Experiences in commercial operation of a basic-lined cupola the last two years are described by the author. Advantages and disadvantages of this type cupola compared with acid practice, and properties of the metal produced, are discussed

Operating a Basic Cupola

By SAM F. CARTER
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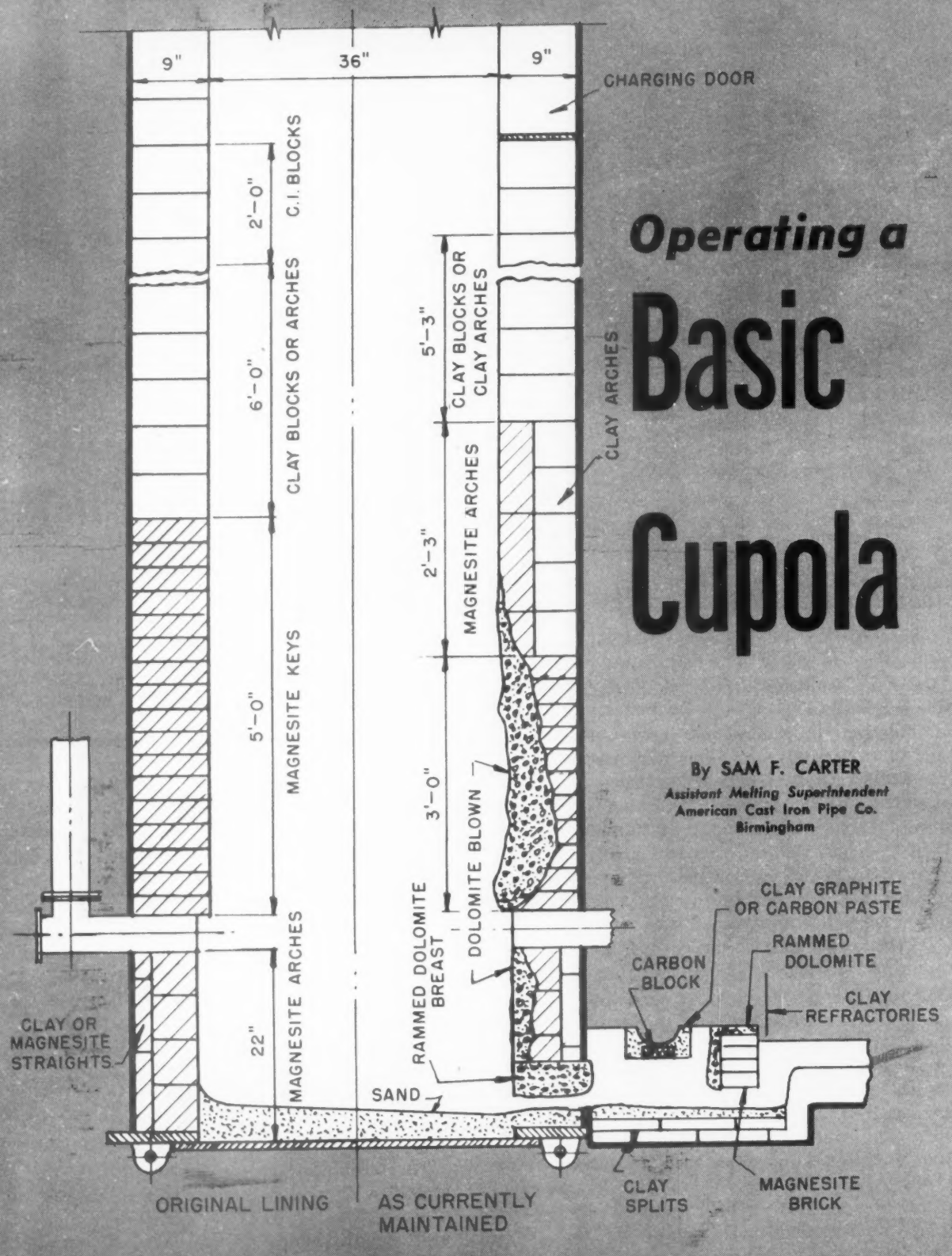


Fig. 1—Lining details of a basic cupola

THROUGH the years the conventional cupola with an acid lining has been operated purely as a melting furnace with no chemical refinement expected. Cumulative sulphur absorption and declining raw material quality have made it increasingly difficult to meet the more rigid and more varied metallurgical expectations with the materials available and the chemical limitations of the acid cupola.

In Europe some theoretical and experimental consideration has been given a cupola lined with basic refractories, but such an operation remained chiefly an academic dream because of questionable control and refractory service. Within the last decade the British made such a basic cupola a practical reality, and Renshaw reported successful production experiences. Most of these first basic cupolas were operated on special applications and/or raw material situations, and the versatility was not immediately evident.

Basic cupola research was started in our plant five years ago. The first three years of experimentation and short production trials were reported in a previous paper[1]. Production trials gave satisfactory performance. A magnesite brick lining was more resistant than clay refractories but refractory costs were very high. Cheaper basic refractories were anticipated.

Small experimental heats were used to explore basic behavior and acquire familiarity with controlling factors. On over 100 experimental heats, a variety of metal charges were melted with two different types of coke and a number of flux combinations. When slags of proper basicity were obtained, considerable desulphurization was accomplished and carbon absorption was extended beyond the limitations of acid cupola melting. Many sulphur contents of .005 to .040 per cent were obtained directly from the cupola. Whereas the acid slag had always been considered an incidental nuisance, the basic slag was shown capable of accomplishing desirable chemical refinement.

On the basis of the desulphurization accomplished and the increased carbon pickup several varied applications were suggested in which basic melting might find a place either in improved iron quality or in relieving raw material problems through successful use of more scrap and lower quality materials. The basic refinement made possible an iron chemistry very suitable for the newly developed nodular or ductile iron.

For the last two years we have been operating one of our smaller production cupolas with a basic lining. This cupola is a 36-in. ID furnace melting 4 tons per hour for five to eight hour shifts. The output is predominantly a gray iron of 0.20 per cent phosphorus content[2]. A number of occasional special irons have been melted on this cupola. After a few early troubles the operation has been very satisfactory. Practically all the lower phosphorus irons have been melted with an economic advantage and some of the special irons have been produced with considerable economic and/or metallurgical advantages.

Our operating experiences have continued to verify the versatility as well as the practicability of the basic cupola for a number of melting applications. Continual progress is being made in understanding basic melting and reducing the cost of refractories. The experiences of a number of American plants that have installed basic cupolas within the last two or three years, together with the longer experiences in Europe, have established more clearly the advantages and limitations of basic melting in the foundry field.

Refractory Lining and Maintenance—Fig. 1 shows details of the basic lining used in our cupola. The left side shows the original magnesite brick lining and the right side the lining as it is presently maintained with a monolithic dolomite patch blown with a pneumatic gun. Basic refractories are necessary only in the portions of the lining that directly contact the slag or contribute to the slag.

Before arriving at our current procedure for daily patching, we investigated five fundamentatlly different combinations and eight different basic materials. Our earlier basic cupolas were maintained primarily with rather expensive magnesite brick which were available for higher temperature steel furnaces. Some patching with rammed magnesite and rammed dolomite showed considerable economic promise. With the introduction of the pneumatic guns for cupola patching we succeeded in blowing several of the granular basic materials produced for steel furnace hearths. Slight adjustments were usually made on the commercial mixtures, either in the bond or size distribution, to facilitate the application with our particular gun. A comparative study was made of daily attack and refractory maintenance costs. Results are summarized in Table I.

All the basic materials were equal to or better in performance than clay refractories, but considerably higher in cost. Patching with magnesite brick gave the least attack but the highest cost. Although re-

TABLE I—Comparative Refractory Performance and Patching Costs

(25 Ton Heats—36-in. Cupola)

Patch Material	No. Days Averaged	Max. Attack[1] Per Side	Patch Cost Per Ton[2]
Acid:			
Clay brick	18	6.0 in.	$1.51
Ganister-clay gunned	4	4.8 in.	1.10
Basic:			
Magnesite brick	18	2.4 in.	3.80
Magnesite rammed	3	3.5 in.	...
Magnesite gunned	4	3.8 in.	2.68
Dolomite rammed	4	4.0 in.	...
Dolomite gunned	30	4.2 in.	1.85

1. Difference in lining before and after heat at point of maximum attack. 2. Both material and labor costs of patching back to original dimensions.

TABLE II—Basic Mixes with Varying Slag Basicity

(Producing same final chemistry: 2.00% Si, 3.40% C, 0.20% P)

Flux Charge	Proportion of Steel	Silicon Loss	Carbon Pickup	Sulphur Final
Acid —4% Limestone	30%	15%	.45%	.090%
Basic—No Flux	35%	20%	.65%	.075%
1% Limestone	40%	24%	.85%	.070%
2% Limestone	50%	27%	1.25%	.060%
4% Limestone—½% spar	60%	30%	1.60%	.050%
1% CaC_2, 4% limestone, 1% spar	80%	30%	2.40%	.030%

Rounded averages of several days operation based on average raw material conditions.

Silicon loss is per cent of overall silicon addition with .25% silicon inoculation added to ladle as FeSi.

Carbon pickup is per cent carbon content above calculated carbon content of charge.

fractoriness was slightly less, the blown dolomite preparation has given us the best overall cost. On this particular cupola the dolomite patching cost was $0.75 per ton of melt higher than acid patching with a blown ganister mixture. This was a 68 per cent increase in refractory cost. Economic justification for a basic lining can be expected only when this increased refractory cost can be overcome by greater savings in the metal charge or improved casting quality.

This cupola is equipped with water cooling by external sprays. As expected, the water cooling does not appear to retard refractory consumption until the lining has been burned very thin. However, operations for a few days were successful with essentially no refractory lining in the melting zone. One of our acid cupolas is operated regularly with external water cooling and practically no lining. Water-cooled acid and basic cupolas with either external sprays or internal jackets have been operated successfully by a number of plants both in Europe and the United States. With further development water cooling seems to offer more relative advantages on a basic furnace.

Some special consideration must be given the slag hole refractories because of the more corrosive nature of the basic slags. The basic cupola in our plant has been operated both as a back-slagging, intermittent-tap cupola, and currently as a continuous-tap, front-slagging cupola. In back slagging, the rear slag hole received the abuse. Clay-graphite refractories were sufficient for only short heats of two or three hours. Slag holes rammed from dolomite and magnesite, when properly bonded and densely rammed, have lasted satisfactorily for a one-shift operation. Silicon carbide blocks have lasted generally one and two days. Graphite and carbon slag hole blocks proved completely resistant to slag attack and slag adherence but were gradually burned larger by escaping air when left open too much.

In front slagging the special refractories are needed in the tap hole, the slag skimmer knife, and runner box wherever contacted by the slag. Tap holes rammed from both dolomite and magnesite have performed with consistent satisfaction for a one-shift operation. Frequently these have been used two or three days with essentially no patching. High alumina brick (98% + Al_2O_3) have shown good resistance, but at a higher cost than other materials. Our runner box and slag knife are made from magnesite brick with a 1-in. inner lining of rammed dolomite. The daily attack is confined to this dolomite layer, which is patched after each day's operation. The slag overflow and run-off trough are lined with thin graphite or carbon blocks with the sides formed from carbon paste or clay-graphite refractories. Carbon blocks and pastes have proved completely resistant to slag attack and adherence, but are attacked slowly by hypoeutectic iron if extended below the slag level.

Flexibility by Varying Slag Basicity — A cupola with a basic lining may be operated at several distinct levels of slag basicity, dependent on the quantity of basic flux used. For that reason experiences from various cupolas cannot be properly compared without consideration of slag basicity level. Larger slag vol-

TABLE III—Special Irons Made in Basic Cupola

(Typical Short Heats—36 in. Production Cupola)

Type Iron	Metal Charge	Flux Charge	Metal Chemistry S	Si	C	Alloys
1. Nodular Iron	50% Steel 50% Low-phos pig	4% CaC_2 4% Limestone, 2% spar	.010	2.07	3.90	Mg
2. Permanent Molds	30% Steel 70% Pig	6% Limestone 2% Spar	.040	1.79	3.80	Cr
3. Forging "Die Pots" (A)	100% Alloy return	4% Limestone ½% Spar	.061	1.10	3.97	Ni, Mo, Cr
(B)	100% Alloy return	2% Limestone	.073	1.22	3.70	Ni, Mo, Cr
4. Ni-Resist	100% Ni R return	6% Limestone 1% Spar	.082	2.18	2.84	Ni, Cu, Cr
5. High Strength	90% Steel	1% Limestone	.082	1.67	2.87	

TABLE IV—Typical Basic Cupola Slags with Varying Degrees of Basicity

Flux Charge	Metal Sulphur %	Slag Composition, % SiO_2	Al_2O_3	$FeO_{(2)}$	MnO	$CaO_{(3)}$	MgO	S	Basicity Ratio$_{(1)}$	Slag Appearance
Mild Basicity										
1. 5% Lst, 1% Spar, First Ladle	.079	36.5	11.5	13.4	2.6	26.1	5.7	0.04	0.87	Glassy, black
2. No Flux	.074	37.5	12.8	3.1	1.8	23.2	20.1	0.28	1.15	Resinous, dark black
3. 1% Limestone	.061	34.3	9.4	1.7	1.7	30.5	22.0	0.39	1.53	Dull, black
4. 2% Limestone	.064	35.1	7.8	2.2	1.7	35.0	16.8	0.46	1.47	Dull, brownish black
Medium Basicity										
5. 4% Lst, ½% Spar	.047	28.6	6.55	1.8	1.2	41.2	19.6	0.56	2.12	Dull, brownish gray
6. 4% Lst, Hot Blast 450° F	.030	26.0	9.2	2.9	0.6	32.5	28.6	1.26	2.35	Dull, dark gray
7. 1% CaC_2, 4% Lst, 1% Spar	.032	25.8	6.5	2.0	0.6	40.3	23.2	3.08	2.46	Dull, brownish gray
High Basicity										
8. 4% CaC_2 4% Lst, 2% Spar	.010	18.8	12.5	0.4	0.6	62.4	9.0	2.50	3.80	Powder, grayish white
9. 5% CaC_2, 5% Lst, 3% Spar	.005	15.8	15.2	0.2	0.1	59.3	8.6	...	4.29	Powder, grayish white
100% Scrap Charges with Increasing Basicity										
10. 3% Limestone	.069	35.4	10.1	1.9	1.9	34.1	16.2	0.46	1.42	Dull, brownish black
11. 4% Lst, ¼% Spar	.051	32.4	11.7	1.2	0.6	39.0	15.1	0.62	1.67	Dull, medium brown
12. 6% Lst, 2% Spar	.022	30.6	7.8	0.7	0.8	42.3	15.2	0.70	1.88	Dull, light brown

1. Basicity ratio $\frac{CaO + MgO}{SiO_2}$
2. Total Fe_2O_3 and FeO determined as FeO.
3. Total calcium determined as CaO.
4. Total sulphur determined by gravimetric precipitation as $BaSO_4$.

TABLE V—Comparison of Properties—Acid vs Moderately Basic

(Equal Chill Depths—1.20 in. Bars)

	No. Tests	Average Analyses S	Si	Mn	P	C	Carbon Equiv.*	Transverse Load (lbs)	Defl. (in.)	Tensile (x10³ psi)	Bhn	Tens./Bhn
Acid	(12)	.089	2 09	.67	.26	3.39	4.09	2325	.261	36.9	204	181
Basic	(12)	.053	2.00	.66	.19	3.32	3.98	2505	.281	39.9	212	188

* Carbon equivalent = C + .3(Si + P)

TABLE VI—Comparison of Properties—Lo-S Acid vs High-S Basic

(1.20 inch bar)

	No. Tests	Average Analyses S	Si	Mn	P	C	Carbon Equiv.*	Transverse Load (lbs)	Defl. (in.)	Tensile (x10³ psi)	Bhn	Tens./Bhn
Acid	(33)	.078	2. 3	.61	.20	3 37	4.07	2328	.278	33.9	197	172
Basic	(31)	.066	2.00	.68	.21	3.35	4.01	2410	.276	36.3	203	177

* Carbon equivalent = C + .3(Si + P)

TABLE VII—Properties in Various Diameter Bars

	Carbon Equiv.[1]	Mn	S	Modulus of Rupture (×10³ psi) 5/8"	7/8"	1.2"	2.0"	Tensile (×10³ psi) 5/8"	7/8"	1.2"	2.0"	Drop Test[2] (inches) 5/8"	7/8"	1.2"	2.0"
Ac'd	4.15	.61	.093	58	62	62	57	40	40	36	29	2 6	5.9	9.8	20.2
Basic	4.12	.55	.045	68	65	63	62	45	41	36	29	2.5	7.5	10.7	21.3

1. Carbon equivalent = C + .3(Si + P).
2. Hammer dropped from successive 1-in. increments. Average height of four tests. For 5/8" and 7/8" bars, 12½-lb hammer on 4-in. supports. For 1.2" bar, 25-lb hammer on 6-in. supports. For 2.0" bar, 50-lb hammer on 12-in. supports.

umes and slags of higher basicity remove more sulphur from the metal. The more basic slags also wash away the acid ash from the coke more effectively, producing a higher carbon pickup and more reactive combustion. The additional use of small percentages of calcium carbide, by virtue of its exothermic and strongly reducing effect, has enabled us to make the slag still more basic and lower in FeO, the sulphur extremely low, and the carbon pickup still greater.

On the low basicity extreme our basic furnace has been operated with no flux addition. The basic refractory consumed from the lining more than neutralized the acid constituents from the coke ash and silicon oxidation so that the resulting slag was still slightly more basic than an acid slag. The charge was little different from an acid mix and the sulphur was only slightly lower. Progressive increases in flux quantity produced increased slag basicity and final sulphurs were decreased progressively from .075 per cent to .030 per cent. To compensate for the increased carbon pickup the proportion of steel in the mix was increased from 35 per cent to 80 per cent to produce the same carbon content averaging 3.40 per cent. Table II shows five different basic mixes along with an acid mix that we have used to obtain iron of the same chemistry, except for sulphur.

In our raw material situation and on lower phosphorus iron the basic mix has proved a net economic advantage by virtue of the increased proportion of steel scrap. The 60 per cent steel mix effected a net saving of over $2 per ton. The 80 per cent steel mix with carbide produced a further saving but required closer supervision to maintain good control.

As indicated in Table II silicon loss is much higher in basic melting and must be considered chemically and economically. No manganese has been required on our basic operation. Better manganese recovery with a basic slag has produced manganese contents of 0.45 to 0.70 per cent, which are sufficient to neutralize the lower sulphur contents of .030 to .070 per cent.

Nodular and Special Irons—The reactions under a highly basic slag have produced chemical accomplishments beyond the limitations of the acid cupola, some of which have desirable metallurgical applications. Table III shows some of the occasional special irons made advantageously in our basic cupola.

The first special iron described is a heat of nodular iron for casting research. Irons of 0.010 per cent sulphur and 3.90 per cent carbon were obtained with a flux charge of 4 per cent calcium carbide, 4 per cent limestone, and 2 per cent fluorspar. This basic iron required only one-third the magnesium alloy addition usually needed for acid cupola iron. From the reduced alloy consumption and savings on the base metal charge, the basic cupola has shown us potential net savings of $10.00 to $12.00 per ton on nodular iron. Although we have had little repetitive experience on this iron, Flinn and Kraft[3] have verified these advantages in regular nodular production. A number of plants are using basic cupolas successfully on regular production. From the economic and metallurgical standpoint the basic cupola seems to offer the most definite advantages for nodular iron.

The second iron in Table III is a permanent mold application in which a very high carbon iron is desired for heat shock resistance. The basic cupola made it possible to obtain 3.80 per cent and higher carbons which could not be obtained readily in our acid cupola. Furthermore, the use of 30 per cent steel scrap substituting for low-phosphorus pig iron produced a net saving of $4 per ton where low-phosphorus content was desired.

The third iron for forging dies is another high-carbon heat for shock application, alloyed with nickel, molybdenum and chromium. (*Please turn to page* 250)

Versatile

THE Experimental Foundry of the National Bureau of Standards, Washington, is engaged primarily in foundry research. However it also provides casting service for all the divisions of the National Bureau of Standards as well as many other government agencies. Most of these castings are made from iron, copper, aluminum, magnesium or lead-base alloys and weigh less than 200 pounds. These castings are for components not readily obtainable elsewhere and are rarely duplicated since they usually are parts of some experimental apparatus.

When castings require cores, suitable coreboxes must be constructed. Since only a few of these cores are alike, a large number of coreboxes accumulate. This not only poses a serious storage problem for coreboxes, but also suggests the need for a versatile type of cylindrical corebox which would reduce the necessity of making new boxes for each job. By designing a set of coreboxes which would satisfy the dimensional requirements of the majority of cores used, it was believed that a considerable economy could be effected.

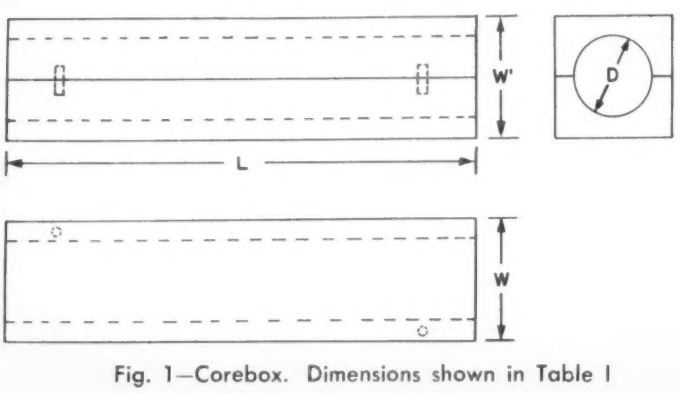
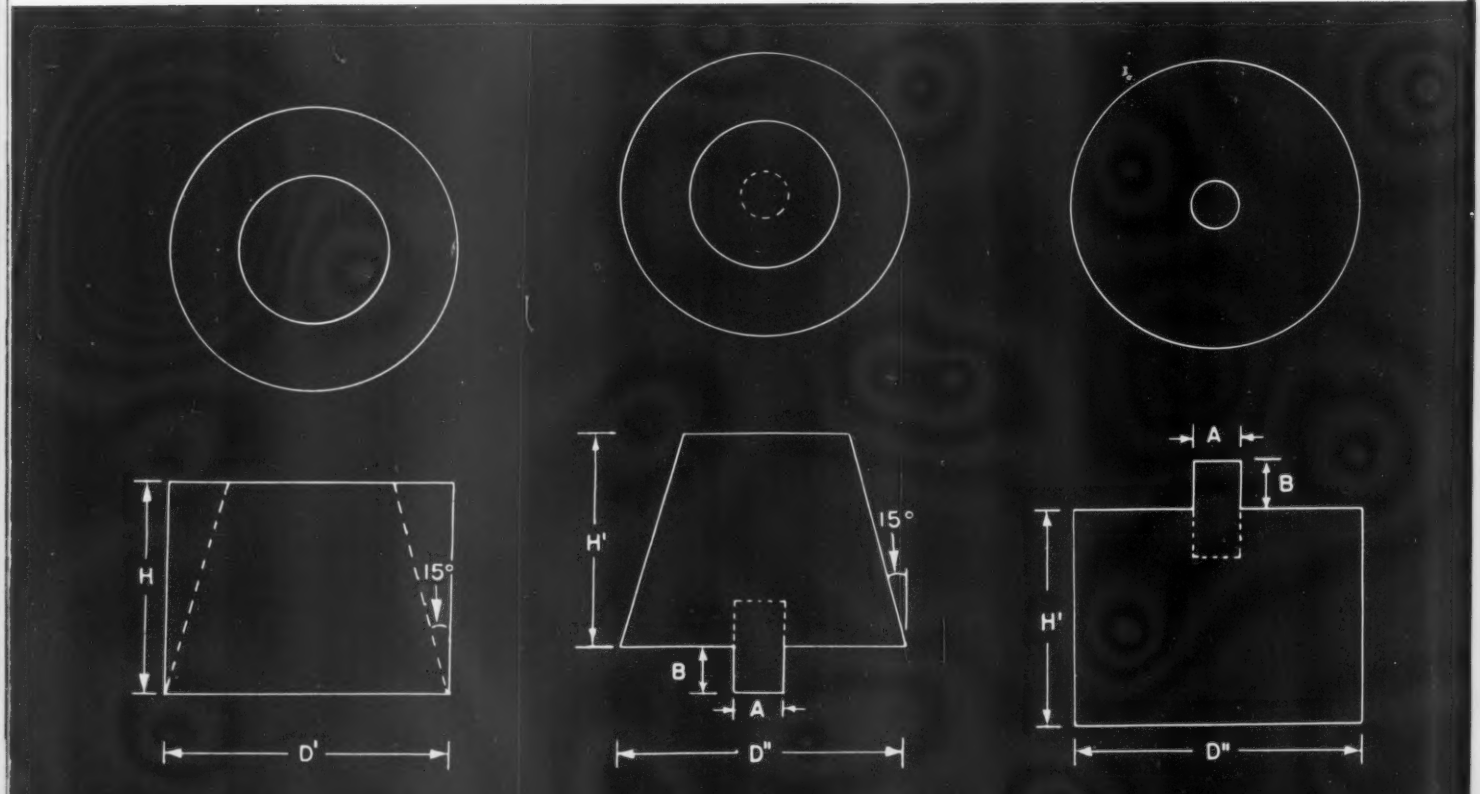


Fig. 1—Corebox. Dimensions shown in Table I

With this purpose in mind, a set of 14 coreboxes for cylindrical cores was made of wood. However, in many instances metal may prove to be a more satisfactory material. The design of the boxes is shown in Fig. 1, and the dimensions in Table I. This set allows the coremaker a range of diameters from $\frac{3}{8}$-in. to 2 in. in steps of $\frac{1}{8}$-in. Other sizes may be added to the set if required. The holes are symmetrical throughout the entire length. Although the lengths of the boxes are optional, they have been made for the maximum length appropriate to the diameter as determined from experience.

In common practice if a cylindrical core is to be used in the horizontal position, it has the same diameter from one end to the other. However, when used in a vertical position it is customary and advantageous to taper the cope or top end of the core to facilitate centering and to avoid crushing it when the cope is placed on the drag. Customarily this taper of the core is effected by making the taper an integral and



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Coreboxes

permanent part of one end of the corebox. To simplify the corebox construction, need for a taper at the end of the box was eliminated by substituting inserts machined from metal bar stock, as shown in Fig. 2.

The lack of uniform practices in tapering the end of the core has been one of the principal factors requiring new coreboxes and core prints for every new casting order received in the foundry. In consulting the references listed in the bibliography of this paper, the suggested taper for cores ranges from 2 to 18 degrees. From experiences in this foundry, it was decided to standardize on a 15-degree taper for the cope end of the core. A standard vertical length for the taper was also adopted for each core diameter. Each insert is 1/32-in. smaller in diameter than the corebox in which it is to be used, thereby permitting the insert to be dropped or placed at the bottom of the box prior to ramming. Brass is an excellent material for this application because of its machinability, corrosion resistance, and hardness. The sand does not stick to the metal and the surface is not easily scarred in ramming and venting operations. The dimensions of the inserts are shown in Table I.

Adoption of standard taper and length for the core ends also permits the use of a master set of core prints. Consequently, a set of core prints for the cope and drag ends of the vertical cores was made according to Figs. 3 and 4 with the dimensions given in Table I.

Since the length of the cores is also a variable depending on the casting, provisions were made for making cores of various lengths. If the core does not contain vent rods, it may be made the full length of the corebox and cut off to the desired dimension. However if vent rods are used or a large number of

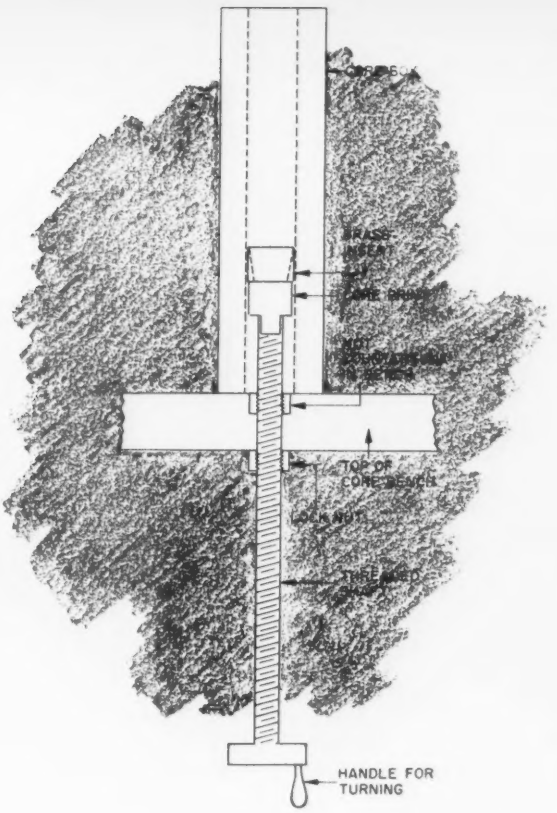

Fig. 5—Arrangements for ramming cores

cores shorter than the box are needed, time and material may be saved by cutting a cylindrical piece of wood to the proper length, placing it at the bottom of the corebox cavity, setting the insert on top of it, and ramming the core. A more versatile arrangement for making any length of core is shown in Fig. 5 in which the length is varied by rotating the threaded rod. The rod is designed so that a core print can be placed on top of it to serve as a stage to support the brass insert.

As previously mentioned, cores made for use in the horizontal position are not tapered at either end and are therefore rammed without using the brass insert. Since horizontal cores are apt to be subject to severe hydrostatic pressures during pouring, it is especially important that they have adequate support at each end. For this reason, the (*Please turn to page* 342)

TABLE I—Dimensions of Corebox, Insert and Core Print

Corebox Dimensions (Inches)					Brass Insert Dimensions (Inches)		Vertical Core Print Dimensions (Inches)				
No.	D	L	W	W¹	D¹	H	D¹¹	H¹	B	A	No.
1	5/8	6	2	2	11/16	3/4	5/8	5/8	1/4	1/4	1
2	1/2	6	2	2	15/32	3/4	1/2	3/4	1/4	1/4	2
3	5/8	8	2	2	19/32	3/4	5/8	3/4	1/4	1/4	3
4	3/4	8	2	2	23/32	7/8	3/4	7/8	3/8	3/8	4
5	7/8	8	2 1/2	2 1/2	27/32	7/8	7/8	7/8	3/8	3/8	5
6	1	8	2 1/2	2 1/2	31/32	7/8	1	7/8	3/8	3/8	6
7	1 1/8	10	2 1/2	2 1/2	1 3/32	7/8	1 1/8	7/8	1/2	1/2	7
8	1 1/4	10	3	3	1 7/32	7/8	1 1/4	7/8	1/2	1/2	8
9	1 3/8	10	3	3	1 11/32	7/8	1 3/8	7/8	1/2	1/2	9
10	1 1/2	10	3	3	1 15/32	1 1/4	1 1/2	1 1/4	1/2	1/2	10
11	1 5/8	12	3 1/2	3 1/2	1 19/32	1 1/4	1 5/8	1 1/4	1/2	1/2	11
12	1 3/4	12	3 1/2	3 1/2	1 23/32	1 1/4	1 3/4	1 1/4	1/2	1/2	12
13	1 7/8	12	3 1/2	3 1/2	1 27/32	1 1/4	1 7/8	1 1/4	1/2	1/2	13
14	2	12	3 1/2	3 1/2	1 31/32	1 1/4	2	1 1/4	1/2	1/2	14

D—Corebox inside diameter
L—Corebox length
W and W¹—Corebox widths

D¹—Outside diameter of insert
H—Height of insert

D¹¹—Core print diameter (max.)
H¹ —Core print height
B —External length dowel pin
A —Diameter of dowel pin

By MARTIN G. DIETL
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The Nonferrous CLEANING ROOM

ALTHOUGH a foundry's profit is affected by its cleaning room operations, that department is most often neglected in an improvement program for the foundry in general. More often than not, a modernized foundry will continue to funnel its castings into an outmoded and inefficient cleaning room.

Great emphasis is placed on rigging a pattern to produce a good casting; too little attention is paid to the possible adverse effect on profits when the gate is cut and ground off the casting. The cleaning room's work begins when the pattern is fitted for its gate and runner, and is continued by good coreroom practices, close sand control and good metallurgy. No one will deny that the first function in rigging a pattern is to produce good castings. The second and third obligations are to produce those castings economically and with the least amount of processing time. A pattern that is rigged so badly that its gates cannot be cut readily with a knife, band saw or friction wheel is wasteful of cleaning room man-hours.

Excessive finning caused by either badly fitting core prints or faulty pasted cores also reduces cleaning room efficiency, just as does an inaccurately formulated core mixture. It is axiomatic that a good core has many properties affecting the inside of a casting. Once the metal has solidified, however, the work of the core is accomplished. The core sand mixture can be so formulated that a given percentage is removed from the casting at the shakeout; otherwise the core becomes a liability of the cleaning room.

Good core collapsibility upon metal solidification stems from accurate core mixture control. Similarly, the cleaning room can be further assisted in grinding castings at a minimum of expense by close molding sand control and standardized mold practices. Metal penetration will result from various conditions but, whatever the cause, it becomes the duty of the cleaning room to attempt to salvage such castings by chipping and grinding.

Assuming that other departments of the foundry have reasonable control over those processes which ultimately affect cleaning room operations, let us consider the problems incident to finishing the brass or bronze casting after it has solidified in the mold. Among the earliest means of transporting castings from the foundry to the cleaning room was the wheelbarrow. Its versatility and handiness still makes it an indispensable tool. In any number of small unmechanized nonferrous shops employing 25 people or less, the castings are pulled out of the mold and transported by wheelbarrow to some kind of a core shakeout. This device often is nothing more than an alloted space on the floor where the workman, by means of an air hammer and chisel, knocks the core and any adhering molding sand from the casting. The wheelbarrow is used again to transport the castings to the next operation.

The writer does not wish to infer that the wheelbarrow is a tool of only the small shop; even the largest foundries find full-time use for several wheelbarrows. But since large shops must move greater quantities of castings faster, other transportation methods have been devised. Obviously, the use of skid or tote boxes would enable one man with a power truck to move much greater loads faster. At the same time much of this saving is lost if the handling at each work station remains slow. For instance, it would seem advisable to sort different castings to dif-

Fig. 1—Poured molds riding on roller conveyor are dumped onto oscillating shakeout conveyor

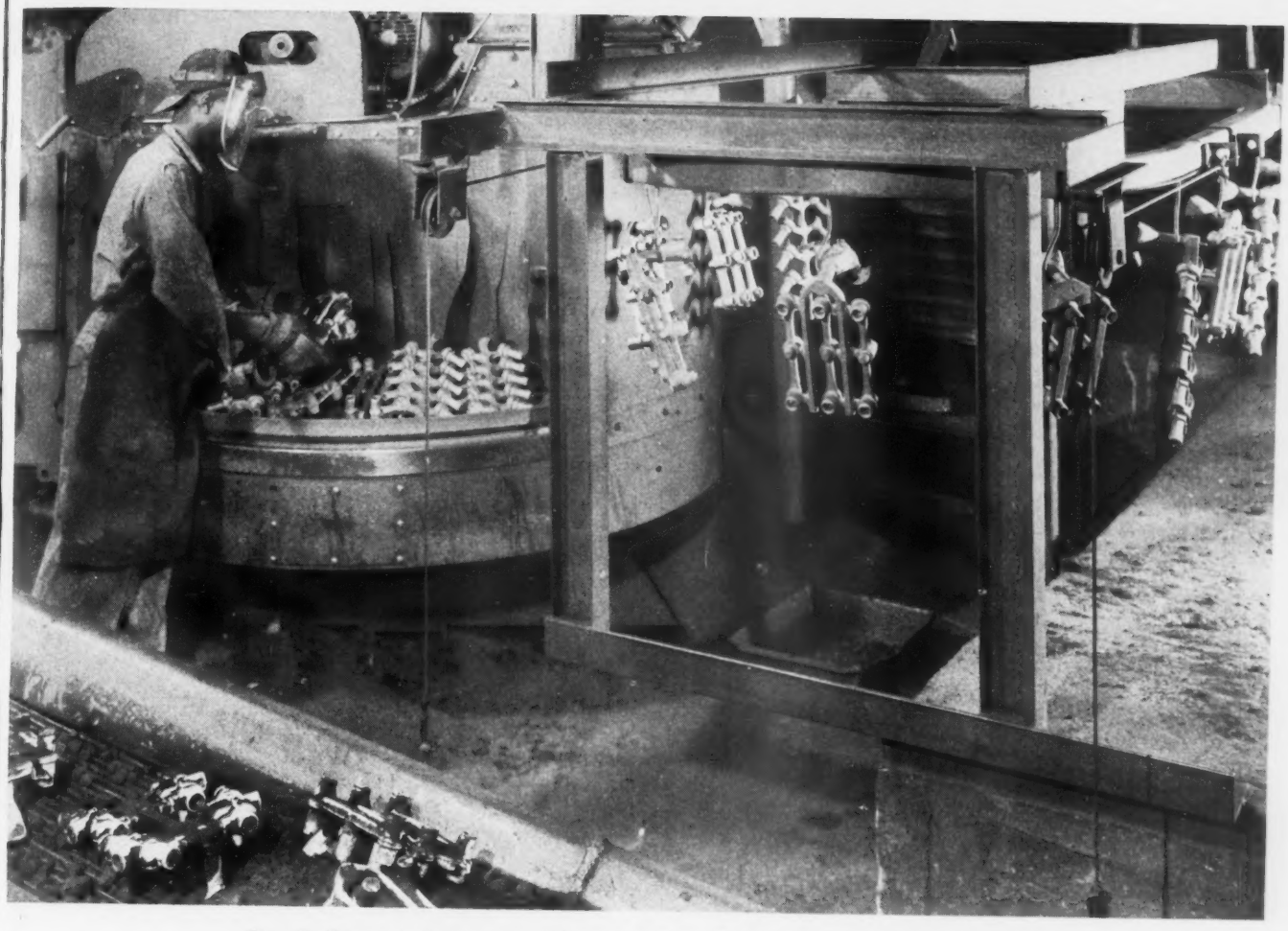

Fig. 2—Separated from sand by grated oscillating conveyor, castings are cleaned in blast table and moved by chain conveyor to the cleaning room

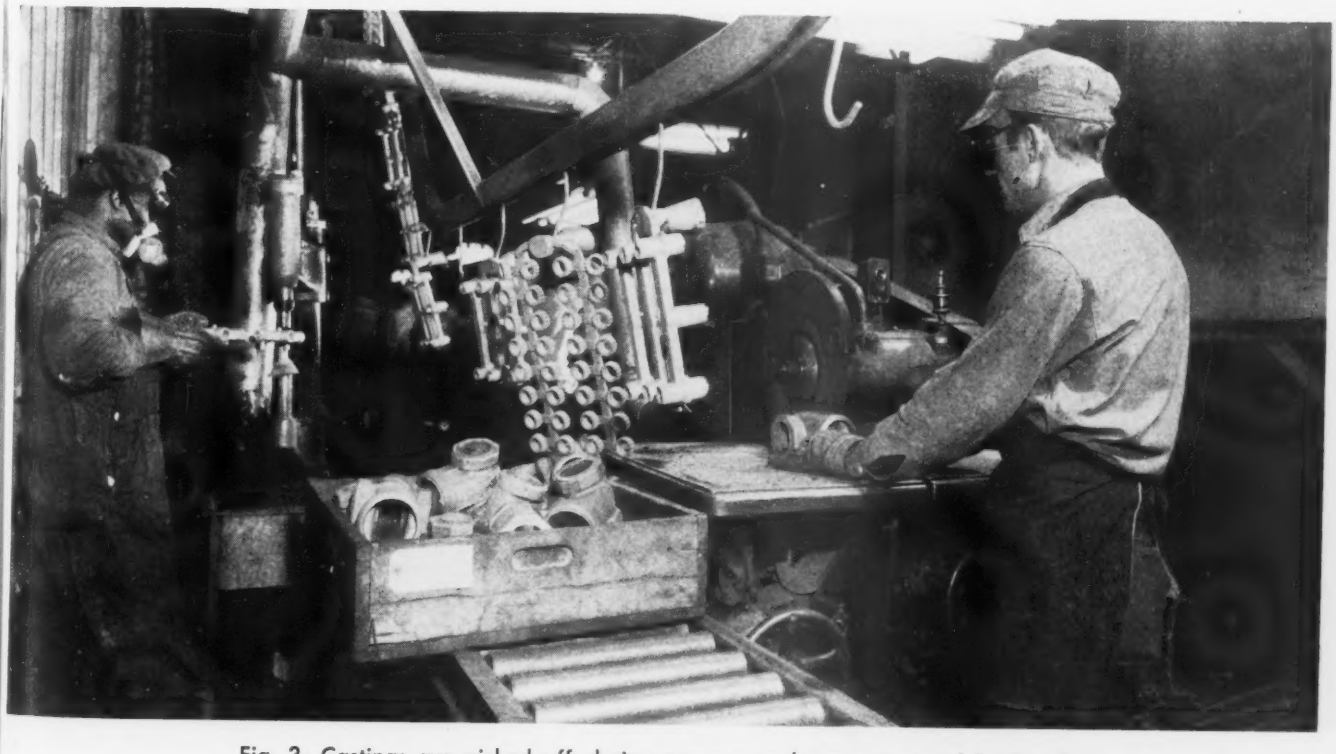

Fig. 3—Castings are picked off chain conveyor and cores removed by knock-out machine (left). Plumbing grade castings are returned to chain conveyor and high-pressure castings go to cut-off machine (right) for gate removal

Fig. 4—Chain conveyor carries plumbing goods and low-pressure valves to three sprue cutters. Each operator handles only the type castings assigned to him. Further separation is effected by funneling specific type castings down each of the four chutes to grinder operators below. After castings have been ground they are removed by wheelbarrows

ferent skids as soon as the molds are dumped; otherwise the cleaning room is obliged to segregate the different orders. Also, castings may be sorted more quickly while still attached to a gate than individually after being cut off.

If the foundry is located on the floor above the cleaning room, large quantities of material can be handled by a chute. This method also has the inherent disadvantage of requiring adequate labor to sort the different castings whenever a number of diverse jobs are so transported. Any type of mechanical transportation of gated castings cannot be considered in the light of faster handling alone. Much thought must be given to the type of castings and quantity to be transported, the work to be done, and the adaptability of any system to the rest of the cleaning room installations.

Many varieties of continuous conveyors will move castings. The popular belt conveyor consists of a duck or asbestos structure impregnated with rubber. The belt is supported by rollers or by sheet steel, and the end or terminal pulleys are connected to a motor through a suitable gear reducer.

Differing somewhat from the belt conveyor is the apron conveyor. In this unit steel plates are interlocked and overlapped to present a continuous surface, and yet be flexible enough to return over a pulley. Underneath, the plates are fastened to a chain which in turn is attached to a flanged wheel. The whole unit runs on a track, and power is applied to a terminal pulley through a sprocket.

The oscillating conveyor applies a different prin-

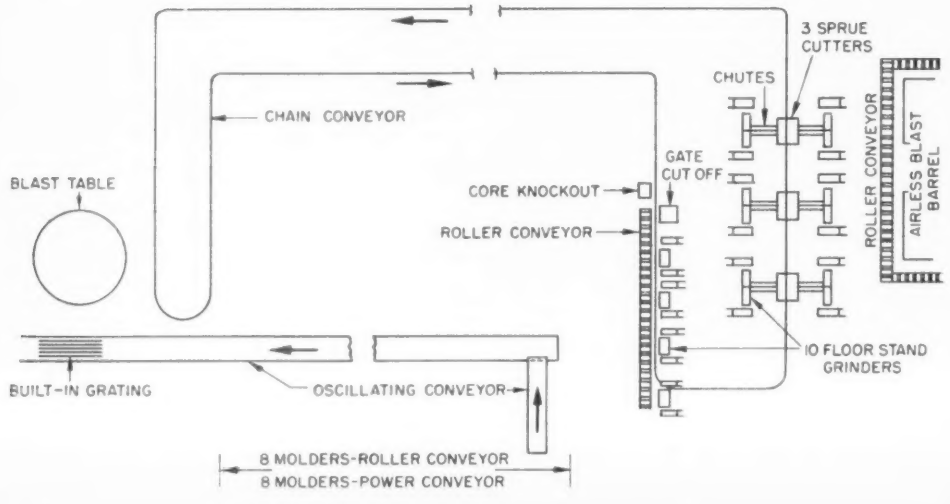

Fig. 6—Layout of the cleaning room at the Schaible Co., Cincinnati, showing flow of castings in process

Fig. 5—High-pressure castings are transported on gravity roller conveyors to stand grinders

ciple of transporting material. The conveyor itself consists of a steel trough, and an electric motor, driving a crankshaft through an eccentric, imparts an oscillating motion to the conveyor.

All of these three conveyors will receive and transport hot sand and castings from the mold shakeout. In the case of the belt and apron conveyors, the material must be fed over a vibrating screen to separate the sand from the castings. With the oscillating conveyor, the trough can be slotted to allow the sand to drop from the castings.

In designing and laying out these conveyors, it is imperative that two conveyors changing direction of travel be set as close as possible to each other, to minimize the distance the hot castings will drop. Otherwise, long and narrow castings will be easily bent.

For handling boxes or pallets of castings, the roller conveyor is easy and economical to install. As a rule, this type of conveyor is either manually operated or the load is moved by gravity. However, a transmission belt can be applied to the underside of the rollers for mechanical transportation.

For certain applications the overhead chain conveyor is preferred. It consists primarily of a chain to which two-wheel or four-wheel trunnions are fastened. The I-beams or monorails, serving as a track, can be assembled in horizontal or vertical curves to suit the need. The load is attached to the trunnion by means of a hook while a caterpillar drive pulls the chain along its predetermined path. Since the castings are still attached to the runners while being transported from the foundry to the cleaning room, it is convenient to hook them onto the conveyor.

Once a variety of castings reach the cleaning room, the laborious and time-consuming job of proper segregation takes place. Small quantities of easily recognized castings are readily sorted and kept segregated as the job passes from one work station to the next, but this operation becomes highly complex when the varieties and quantities of castings are large. Instead of a wheelbarrow, skids or boxes are required to transport many different castings. Since it is not always feasible to separate each job as soon as the molds are dumped, large batches of mixed castings reach the cleaning room floor for sorting. The individual sorting system necessitates a series of batch operations which require excessive handling time in addition to many containers to move and identify the casting lots.

From the sorter the batch of castings go to the core knockout and the sprue cutter. At this point the sprues, properly identified according to formula, are gathered in a box while the castings fall into a suitable container and are moved to the blast station. The cleaned castings then are transported to the grinders. Another blast cleaning or acid dip, followed by inspection, complete the work of the cleaning room.

One can easily see the tremendous amount of handling required just to move the castings from one work station to the next. It represents a highly complex operation in which castings can be unnecessarily delayed, perhaps even lost. An immediate saving of man-hours can be accomplished by studying each job carefully to determine such factors as whether or not a punch and die operation is feasible to trim the casting off its gate. Under those conditions the gates of castings are blasted prior to the punch press operation. Sprue cutting and most, if not all, of the grinding is thus eliminated.

It seems obvious that a more efficient flow of material through the cleaning room will result if manual handling of batches of cast- (*Please turn to page* 276)

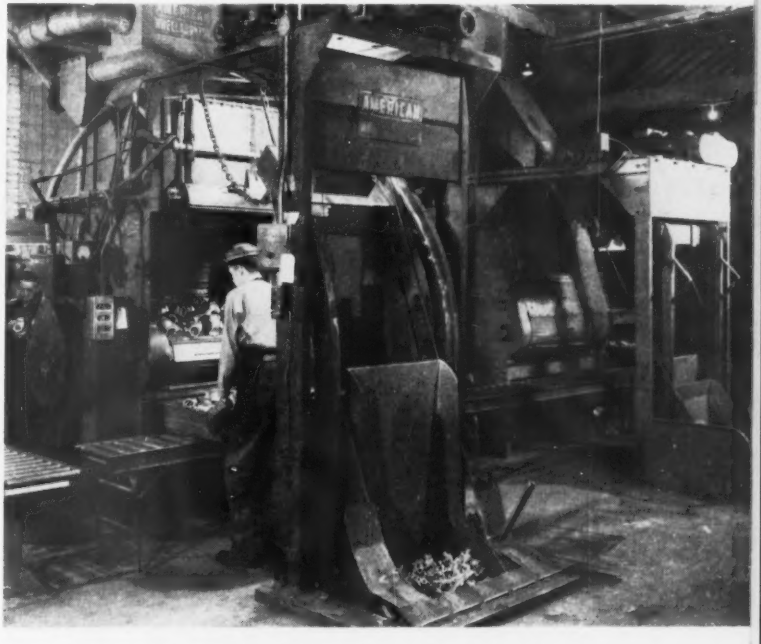

Fig. 7—Final cleaning operation consists of blasting in airless blast barrel. Finished castings are then moved by roller conveyors through final inspection, weighed and taken to shipping platform

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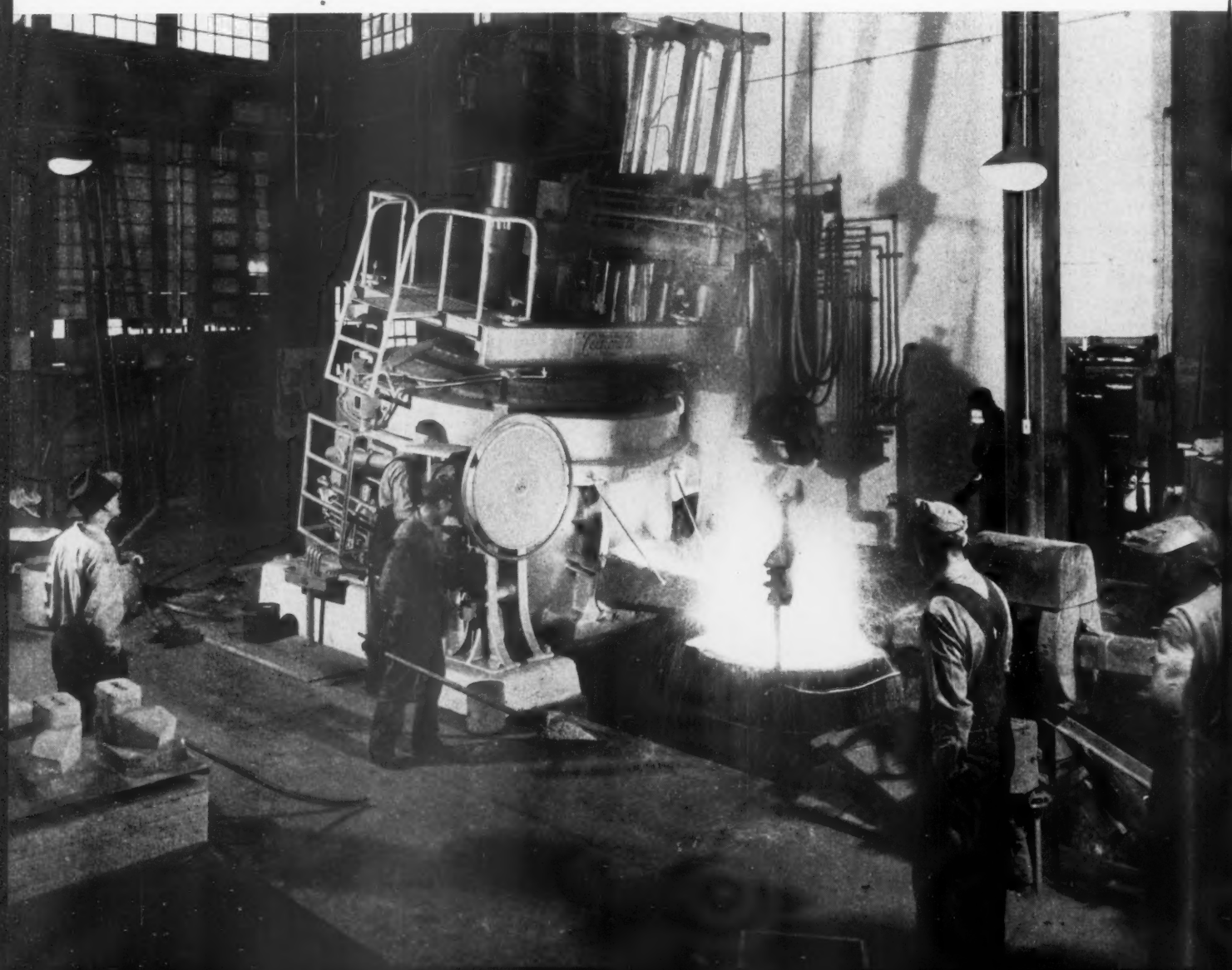
Electric Furnace Melting

FOR STEEL CASTINGS

Starting a new series of articles on steel foundry practice, the author discusses procedure in electric furnace operation. This includes application of the lining, and charging and melting methods

TWO types of electric melting furnaces are used in the steel foundry industry—the arc furnace and the high-frequency or coreless induction furnace. In the former, the metal is melted and heated by arcs struck between the ends of graphite or amorphous carbon electrodes and the charge of steel. The high-frequency induction furnace is in effect a step-down transformer in which the primary winding is formed of a number of turns of water-cooled copper tubing carrying a high-voltage, high-frequency current, and the secondary is the steel charge itself. The metal is contained in a cylindrical chamber lined with refractory material, and surrounded by the primary coils, and is heated by its resistance to the high amperage current set up in it. High-frequency induction furnaces are used chiefly for the manufacture of high-alloy steels.

As electric furnaces were developed originally by



Tapping a heat of steel into the ladle. Photo courtesy of Pittsburgh Lectromelt Furnace Corp.

electrical engineers with little or no knowledge of steelmaking, it is not surprising that many early types of arc furnaces were nearly or completely unworkable because features in the design that looked well on paper were entirely impractical. Several designers attempted to secure part of the heat from the resistance of the furnace bottom and of the metallic charge to the passage of the electric current. In one case a number of water-cooled steel electrodes were built into the bottom, in others a metal plate was buried in the refractory material and formed one point of a gamma-connected, three-phase setup.

In both cases arcs were formed between three suspended electrodes and the metallic charge, and the bottom carried current as soon as it grew hot enough to become a conductor of electricity. The resistance of the charge and the bottom material generated a portion of the heat required to melt the metal. Furnaces with the buried plate are still used to some extent in other countries, but as far as the author is aware, none remains in service in the United States.

The difficulty in having the bottom carry current is that it cannot be heated uniformly, and some one spot always heats up faster than the rest. Since resistance of the magnesite (*Please turn to page* 318)

Log of 18000-lb Two-Slag Basic Heat.*

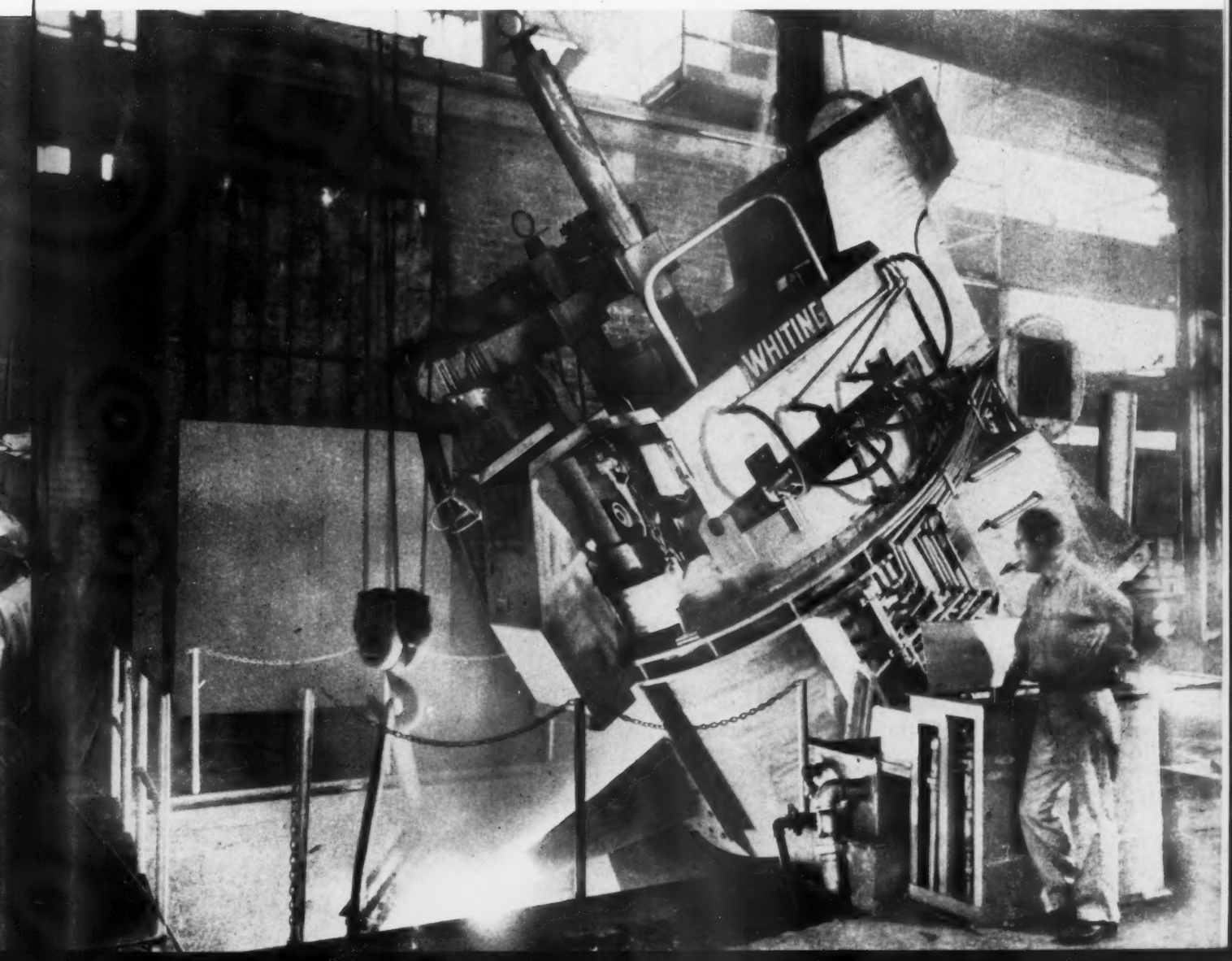
Charge		
Purchased scrap (miscellaneous)		13000–lb
Foundry scrap		5000–lb
		18000–lb
Time		
10:00	Power on high tap	
10:30	Lime 100-lb	
11:00	Lime 200-lb	
11:20	Lime 100-lb	
11:40	Lime 50-lb, power on intermediate tap	
12:05	Melted	
12:10	Test No. 1—0.15%C, 0.13%Mn	
12:30	Test No. 2 (reported 1:30)—0.019%P, 0.047%S	
12:35	Start slag off	
12:42	End slag off	
12:43	80% ferromanganese	105 lb
	50% ferrosilicon	25 lb
	Pulverized carbon	20 lb
12:45	Lime	200 lb
	Fluorspar	25 lb
	Sand	20 lb
12:58	Lime	200 lb
	Fluorspar	25 lb
	Pulverized carbon	10 lb
1:10	Test No. 3—0.22%C	
1:15	Pulverized carbon	4 lb on slag
	Pulverized ferrosilicon	2 lb on slag
1:20	Pulverized carbon	2 lb on slag
	Pulverized ferrosilicon	2 lb on slag
1:25	Carbide slag	
1:30	Pulverized carbon	2 lb on slag
1:35	Pulverized carbon	2 lb on slag
1:40	Slag white, crumbles to powder	
1:42	Test No. 4—0.23%C, 0.38%Mn	
2:05	80% ferromanganese	70 lb
	50% ferrosilicon	95 lb
2:15	Tap	

Analysis

C	Mn	Si	P	S
0.24	0.66	0.30	0.02	0.023

Time of heat 4 hr 15 minutes

*Briggs, *The Metallurgy of Steel Castings*, page 45



Duct work on top of the furnace is for exhausting smoke and fumes. Photo courtesy of Whiting Corp.

In this second and concluding article the author discusses methods of handling molds at the shakeout and the movement of used sand before its preparation for reuse. Handling methods in sand preparation and molding were described in the April issue

Practical Application o

Handling

CONTINUING the discussion started last month of methods of handling molding sand through the four principal stations of preparation, molding, shakeout and storage, we are now arriving at the third station where the castings are removed from the poured molds.

The simplest arrangement used in connection with a roller conveyor setup in shown in Fig. 19. Grates in the floor are used to separate castings from the sand; the latter is received by a belt conveyor running underneath. Steel frames fitted with bars and mounted above the grates, as shown in the illustration, are used to support tight flasks during the shakeout operation. When snap flask work is handled,

Fig. 19—Shakeout arrangement with roller conveyors

Fig. 20 (above)—Dumping snap flask mold through opening in floor onto oscillating trough conveyor

Fig. 21 (right)—Oscillating trough conveyor for carrying sand and castings. Pallet at left ready for dumping. Platform in rear in tilted position

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SAND and MOLD Equipment

frames are not necessary and the molds are dumped directly onto the shakeout grates.

Another typical shakeout arrangement includes transfer car operation. The poured molds after cooling are pushed from roller conveyors on this car and taken to a central shakeout station located in a place convenient for this operation. The empty flasks or bottom boards are returned by the same transfer car to the roller conveyor lines. This arrangement is less expensive but is slower and requires more shunting labor.

A method coming into wide use for shaking out snap flask molds is illustrated in Fig. 20. The operator dumps the molds through the opening in the floor onto an oscillating trough conveyor and stacks the bottom boards on the return roller conveyor. The reciprocating motion of the trough moves the sand and castings toward the vibrating shakeout. The trough conveyor is a practical piece of equipment. It is leakproof and, having a smooth deck, the movement of castings is not obstructed by gates, risers or wires. It is less expensive than an apron conveyor, requires less maintenance care, as it has few moving parts, and needs a minimum of pit depth. The advantage of the apron conveyor, which could be used for the same purpose, is its ability to effect a climb of up to 30 degrees, thus allowing for more convenient location of the vibrating shakeout. The trough conveyor shown in Fig. 21 is a part of the pallet shakeout arrangement; it is shown here to illustrate this unit.

The snap flask molds handled on pallet lines are dumped onto a trough conveyor by the automatic tilting device as shown in Fig. 22. The description of this procedure will be based on the sketch in Fig. 23.

After the molds are cooled, the operator rolls a pallet of molds onto the platform of the tilting device. The air cylinder control handle is at that time in the vertical position. Movement of the handle to the right activates the air cylinder connected with the platform and tilts it downward. The molds slide onto the trough conveyor while the pallet is retained on the platform by two stops (see Fig. 22) and the bottom boards are held by cleats fitted to the pallet. To return the empty pallet back to the molder, the operator moves the handle to the extreme left position. In this position the track of the platform is engaged with the lower track line and the pallet runs down in the direction of the molding station.

Shaking out molds from a continuous mold conveyor can be effected either by automatically-operated tilting dump device (when the molds are made in snap flasks) or by an air-operated pusher which slides the tight flask molds off the conveyor onto a vibrating shake-out.

For producing larger castings, where the copes and drags are shaken out separately, the arrangement shown in Figs. 24 and 25 may serve as a good ex-

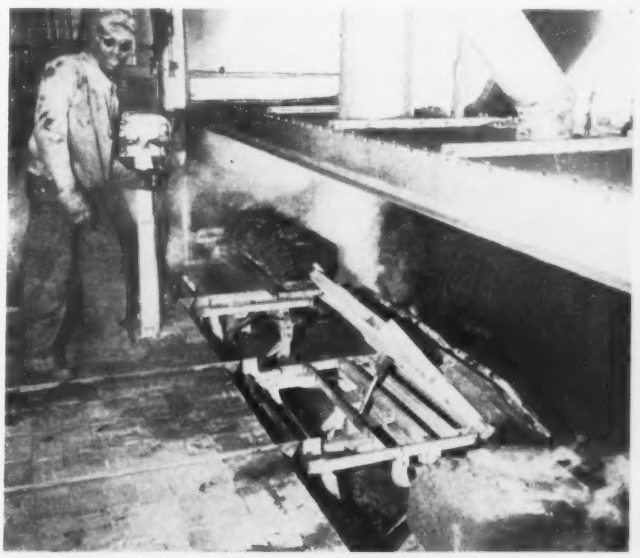


Fig. 22—Air-operated mold dumping station. Details of the device are shown in diagram below

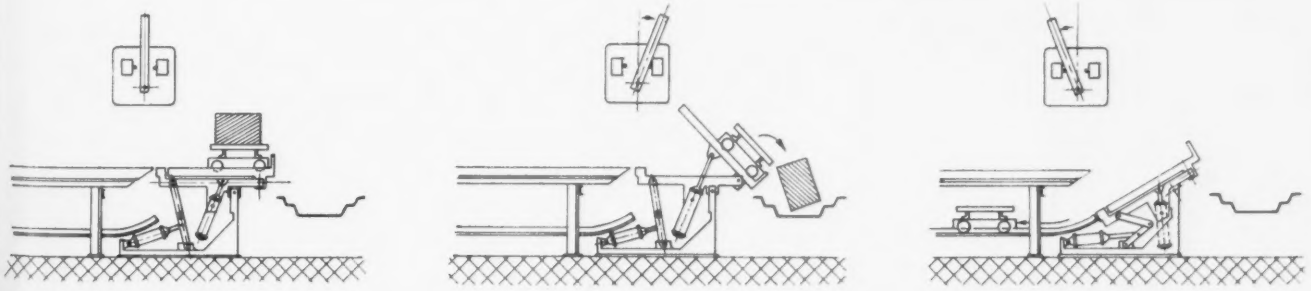


Fig. 23—How the mold-dumping device operates. Normal position shown at left, with the control handle vertical and dumping platform ready to receive platen with molds. Dumping position in center sketch has control handle forward which raises upper tilting platform and dumps molds. In the return position (right) the control handle is moved all the way back. This tilts the upper and lower tilting platform in line with the return rail, and the platen returns on lower rail

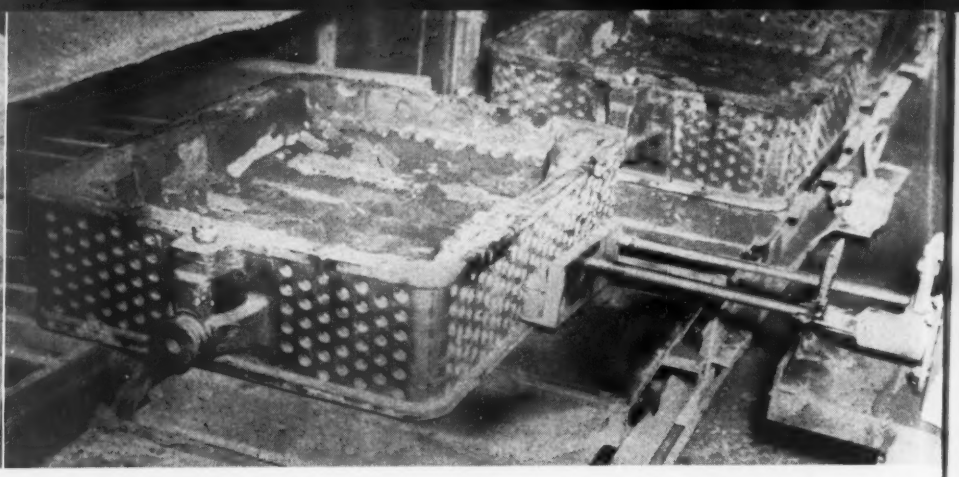
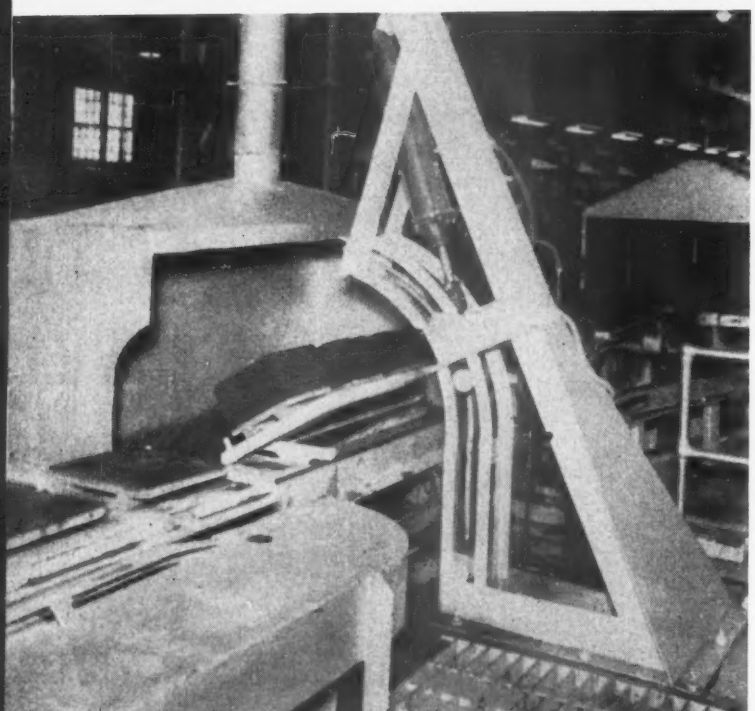


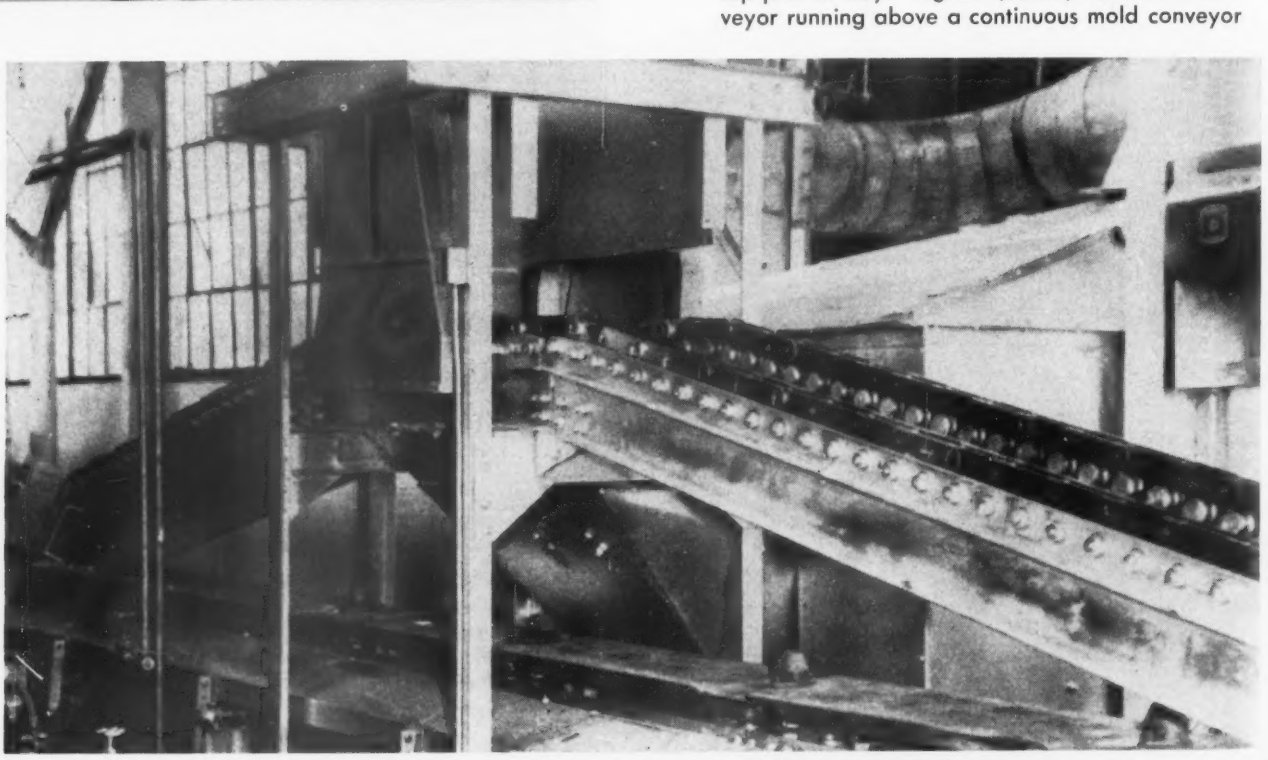
Fig. 24 (left)—Cope shakeout station of a continuous mold conveyor equipped with an air-operated lifting device. Fig. 25 (right)—Air cylinder pusher at drag shakeout station of a mold conveyor



ample of how the molds can be handled.

When the mold, cooled under the smoke hood, arrives in front of the shakeout, the cope is grasped by a scissor-shaped tongs and lifted by air cylinder hoist. This hoist is connected with another air cylinder operating in horizontal position which, when activated, transfers the cope over a vibrating shakeout. From that position it is lowered until it touches the vibrating shakeout deck and is released from the grip of the tongs. The drag is pushed by air cylinder from the mold conveyor onto the other vibrating shakeout. Empty flasks are returned on roller conveyors to the respective molding stations. The ascending sections of roller conveyors are equipped with drag chains to bring the flask to a certain height from where

Fig. 26 (left)—Automatic shakeout station of a semicontinuous mold conveyor. Air cylinder lifts top part of tray. Fig. 27 (below)—Shakeout conveyor running above a continuous mold conveyor



it rolls by gravity to the molding station.

In producing molds with many cores or when it is desirable that the core sand be mixed with the used molding sand, a third shakeout, for castings only, can be included in the system. This operation will also simplify the cleaning of castings, recover most of the sand and reduce the new sand additions into the mixer.

The shakeout station used with a semicontinuous mold conveyor is shown in Fig. 26. Dumping the molds is done automatically by air cylinder arrangement which tilts the hinged upper part of the mold conveyor tray into a discharging position. The quick-acting air cylinder assures sliding the molds onto a conveyor running underneath. A row of lugs located at the edge of the tray prevents the bottom boards from sliding down.

Another completely automatic shakeout arrangement, previously mentioned in connection with continuous mold conveyor (Fig. 14, April) is shown in Fig. 27. This unit is designed for small tight flasks of the same size. The poured molds riding on the mold conveyor are picked up at the foot section of the shakeout conveyor by contacting the double strand of chains with the handles of the flasks. The molds are then lifted to the top position where two knockout vibrators shake out the sand and castings which, in turn, are chuted into a revolving tumbling and screening barrel. After the shakeout operation the empty flasks are carried by the descending chain conveyor and deposited on the trays of the mold conveyor.

Methods of Handling Used Sand

We are now coming to the section dealing with the handling of used sand. The shakeout sand before being stored should be cleaned from tramp metal and other foreign inclusions, freed from lumps and core butts, screened and cooled, if possible. The arrangements shown in Fig. 28 may be considered typical. The sand is passed over a magnetic pulley and screened either on vibrating flat screen or in a revolving hexagonal screen. Vibrating flat screens are used when the shakeout sand is not too lumpy and finer screening is required. Revolving screens are of lump breaking type; they are usually equipped with shelves which pick up the sand during each revolution and drop it against a perforated plate or wire mesh. The rejected oversize lumps may be passed through a crusher and returned to the system.

The used sand can be lifted from the shakeout level to the desired height by an elevator or inclined belt conveyor, as shown in the sketch. It is advisable to apply the second method if the space is available. The hot and damp shakeout sand, spread on the belt, is afforded additional time for cooling during the longer ride.

When production requires the use of facing sand, new sand has to be stored in a separate bin compartment. The new sand can be handled by a separate elevator or belt conveyor or it can utilize the shakeout sand equipment shown in Fig. 29. In layout "A" the new sand, lifted by an elevator, is directed into a bin compartment by reversing the flop gate; in

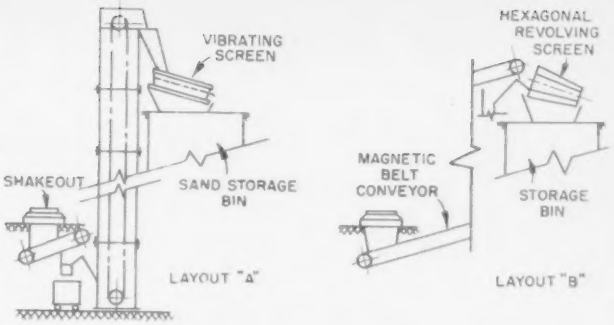


Fig. 28—Two methods of handling used sand from the shakeout to the sand storage bin

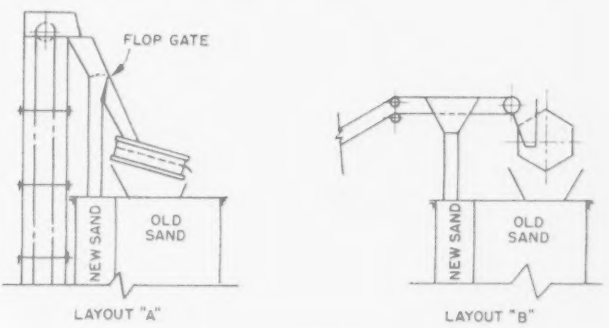


Fig. 29—Two methods of handling new sand delivery into a separate bin compartment

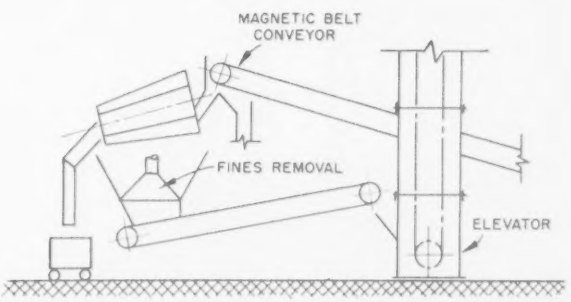


Fig. 30—Handling shakeout sand through a revolving screen located on the floor level

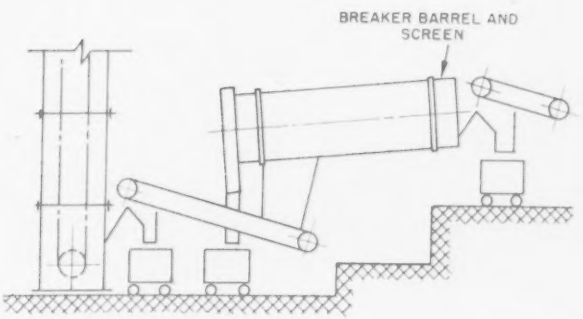


Fig. 31—Method of handling shakeout sand through a lump-breaking revolving barrel

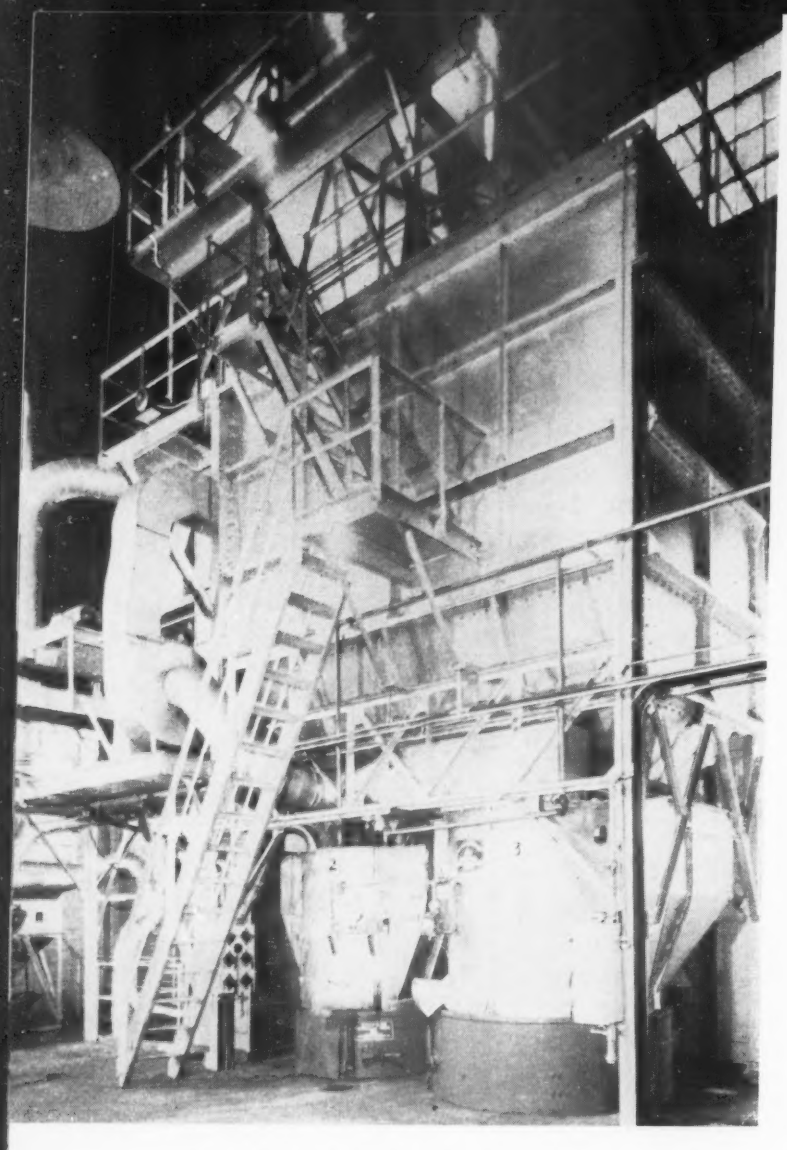


Fig. 32—Sand storage bin above two sand mixers

Fig. 33—Glazed tile silos for sand storage

layout "B" by plowing the belt conveyor.

Before leaving the subject of shakeout sand handling two examples of practical arrangements are worth mentioning. In previous cases the screen was located on the top of the bin; that conforms to the type of "vertical" design which saves floor space. It is more practical, however, to have the screen on the floor level. In such an arrangement the lumps are broken and nonmagnetic impurities rejected before sand reaches the elevator, thus assuring safer and more efficient operation of the unit. Better access for maintenance inspection will make it easier to discover possible screen defects such as holes in the wire mesh or blinding of the openings by wet sand. Fig. 30 shows the recommended arrangement.

Hard lumps, or an excessive amount of rods, gaggers and core wires encountered in some steel shakeout sands require the application of a breaker barrel and two magnetic pulleys, as shown in Fig. 31.

Sand Storage and Charging into Mixers—This is the fourth and last station and deals with storage of sand in bins. The bin is usually built of steel plates properly braced with channel stiffeners. It is supported by H-beams and equipped with stairway and handrailing from foundry floor to the top of the bin. It can be divided in two or more compartments, each narrowed into air operated bin gates. A good example of such a bin is shown in Fig. 32.

The capacity of the sand storage bin should equal a minimum of several hours' sand supply. In foundries where the shakeout operation is not continuous and the molds have to be stored for a certain period, the capacity of the bin may amount to eight hours' sand requirement. Bins with larger capacity are charged by belt conveyor running on the top on the bin. The sand being plowed from the belt at several points allows for more effective filling of the bin.

Circular, glazed-tile silos, as shown in Fig. 33, are frequently used for storing new sand and are installed outside the foundry building. They are also used to absorb surges in supply of used sand caused by intermittent shakeout of large molds.

In completing the cycle of sand circulation we will discuss briefly the methods of charging sand from the bin to the mixer.

Fig. 34 shows a common arrangement used when the mixer is located on the distributing platform. The batch holding hopper is suspended from the sand storage bin. When the operator desires to charge the mixer he presses a push-button which starts the loader mechanism raising the bucket over the dumping guides and discharging the sand into the mixer. After sufficient time has elapsed for complete charging, the bucket automatically returns to the loading position at the bottom of the loader. When the bucket reaches the loading position the gate of the batch hopper is automatically opened, permitting the sand to flow into the bucket. When the bucket is full the flow of sand automatically stops and an adjustable timer starts the motor of the loader, raising the bucket with full charge of sand to its original predumping position at the top of the loader.

Fig. 35 illustrates the conventional method of charging a mixer by batch hoppers. The volume of

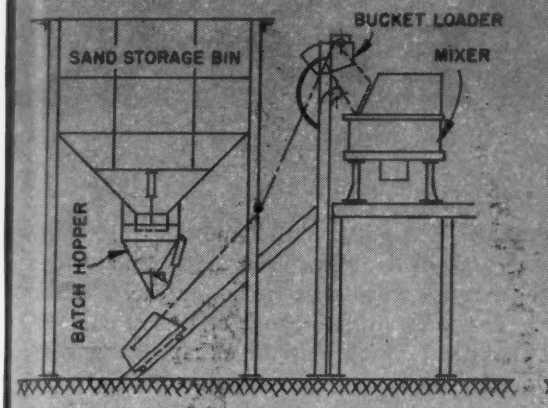


Fig. 34—Charging sand into the mixer by means of bucket loader

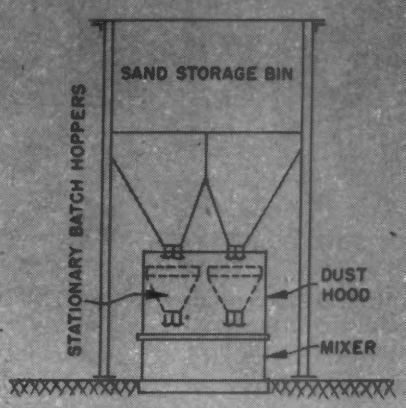


Fig. 35—Charging sand into the mixer by stationary batch hoppers

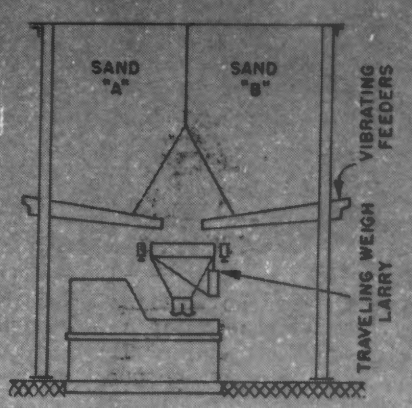


Fig. 36—Use of vibrating feeders in charging sand into the mixer

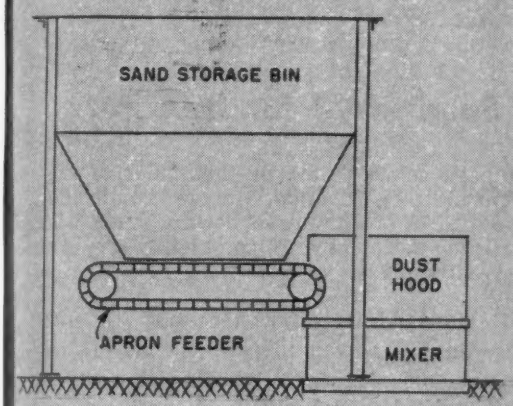


Fig. 37—Apron feeder moves sand from a storage bin to the mixer

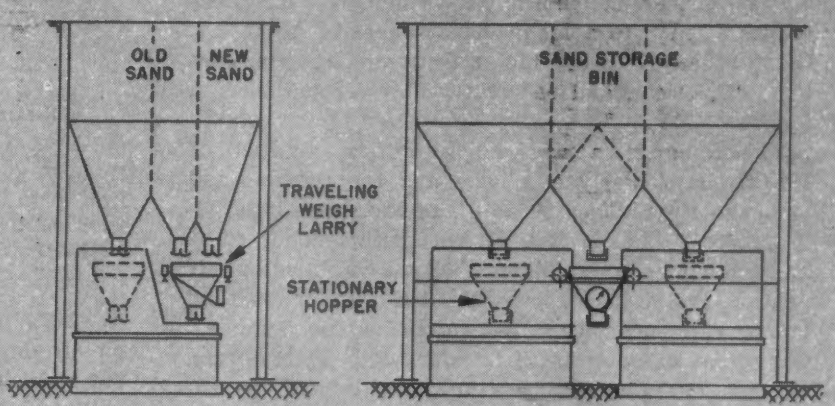


Fig. 38—Use of traveling weigh larry and stationary hoppers in preparing facing, backing or system sand

each hopper equals the batch capacity of the mixer. These hoppers are usually equipped with air-operated gates and are unloaded alternately.

Fig. 36 illustrates a charging method used where two or more kinds of new sand are required for preparation of core sand. Vibrating feeders deliver sand to the traveling weigh larry for exact proportioning of the batch.

Apron feeder arrangements shown in Fig. 37 are used primarily when the headroom is low. The wide gate permits less sloping of the bottom part of the bin and consequently allows more capacity compared with regular gate arrangement. The disadvantage of this method is that the charging time is longer and batch measurement, controlled by timer, is not as accurate as the use of volumetrical method of batch hoppers.

For producing facing sand when new sand is used in larger quantity, a traveling weigh larry is recommended. The larry can be rolled into position under any of several bins where the desired amount of sand is discharged and weighed. When the batch is completed the weigh larry is rolled into position over the mixer and the sand discharged by opening the bottom gate. The arrangement shown in Fig. 38 incorporates the use of both a traveling weigh larry and stationary hoppers. This is the most universal charging setup for preparing facing, backing or system sand.

The foregoing review of the equipment and arrangements represents a series of components backed by successful experience in many sand and mold handling installations. Since each foundry has specific problems no hard and fast rules can be recommended. A careful study of the shortcomings of existing methods, thorough analysis of the requirements and evaluation of mechanical units available on the market should result in an effective layout flexible enough for changing rates of foundry production in either ferrous or nonferrous foundries.

QUESTIONS

Describes Mineral Serpentine

Q.—In the January issue in an article discussing metal penetration, reference was made to a material called serpentine. Have you any information on geological origin, chemical composition, deposits, etc?

A.—The geological term "serpentine" is applied to a group of minerals of the general composition $H_4(Mg \cdot Fe)_3Si_2O_9$ probably crystallizing in the rhombic system. Varieties are known under different names according to habit and optical properties; fibrous types include chrysotile, metaxite and picrolite, and a platey variety is known as antigorite. Hardness ranges from 3 to 4 Moh, and the density 2.5 to 2.7. Color usually is green but is dependent on iron content. Colorless, and red and yellow serpentines are known.

Serpentine is a common alteration product of $MgSiO_3$ particularly of olivine and the rhombic and monoclinic pyroxenes. Asbestos of commerce is largely chrysotile and is derived from both igneous rocks and metamorphosed dolomite. Some varieties of serpentine are used for exterior and interior building stone, one type being known as "verde antique." Quarrying of such stone is conducted in California, Georgia, Maryland, Massachusetts, Vermont, Washington and Wyoming.

Stop Rocking Manhole Covers

Q.—We have had complaints that the covers on our manhole castings rattle when a vehicle passes over them. The rattle, of course, is caused by warpage in one or both castings. Possibly this form of defect might be remedied by machining the edge of the cover and the seat in the frame. The job is open to competitive tender, and the machining cost cannot be absorbed in our present price. Can you suggest a change in the fitting edges of the unit shown in the accompanying sketch?

A.—Rocking covers on manhole castings is an item that has plagued many foundrymen. Since you recognize the cause of the rocking cover as a warpage in one or both castings, the obvious remedy would seem to be new patterns lacking this rocking feature. Even when the patterns are perfect, the manner in which the castings are shaken out may warp the castings, particularly the cover. If this casting is shaken out hot, and allowed to remain partly exposed and partly covered with sand, it inevitably will warp to a certain extent.

The casting may be completely stripped and propped in a vertical position, or, it may be covered with the shaken out cope sand and allowed to remain resting in the drag over night. In some instances the cover casting may be warped even though the pattern is straight. The most prolific cause of this is a mold that is not clamped properly. If the clamps are pulled up too tight, the mold cavity is reduced either at one side or the opposite one. Uneven thickness of the casting will cause the casting to warp. At the opposite extreme a mold that is clamped loosely, or a mold that yields for any other reason, will produce a casting of uneven section. The foregoing may be summarized to read: The only way to produce good castings is to employ good patterns, good rigging and good foundry practice.

Green Sand Mold for Iron Pot

Q.—We have been asked to bid on a number of cast iron pots from 2 to 4 ft diam, but are undecided whether to mold them bottom up or bottom down, also whether it will be necessary to completely dry the mold, or simply skin dry it.

A.—With suitable sand it is not necessary to completely dry the mold or even to skin dry it. If the pot is molded bottom side down, the metal pressure will increase the metal thickness from ⅛ to ¼ in. unless the pattern is lightened to that extent. Cast iron pots from 2 to 4 ft diam usually are molded bottom side up from an iron pattern. The pattern is lowered full depth into a follow board, mouth up. The pattern is filled with sand which is not rammed in the usual manner, but is "tramped off" in courses. A drag then is placed on the follow board, filled with sand and rammed firmly, after which the mold is vented, a bottom board rubbed on, clamped and the assembly is rolled over.

In the large sizes, a section of pipe or a wood block 6 to 8 in. diam is rammed up in the center and removed before the bottom board is clamped in place. The vent pipe or block is set up in the center after the first course of sand has been tramped. This thickness of sand will prevent the metal from breaking through into the cavity left by the removal of the pipe or wood block. After the drag is rolled over, the follow board is removed and replaced by the cope flask, which may be in one or in two parts. On deep pots it is more convenient to use a separate cheek and cope, but on comparatively shallow pots the cope and cheek may be combined.

Metal is poured through two or more small pop gates directly on top and fed from a long pouring basin leading to the edge of the cope. On account of

nd Answers

the comparatively thin metal section of these castings, a section which sets quickly, the question of securing a dense metal does not apply as it does with large pots, usually of fairly heavy section. Really large pots are made bottom side down in dry sand or loam molds.

Lugs, handles and trunnions on these castings are formed either by attaching loose pieces to the pattern, and which may be drawn in after the cope has been lifted off, or by setting small dry sand cores containing impression of the parts against the face of the pattern at the required places and ramming them up as part of the mold. This latter method is practiced where extreme accuracy of position is not essential. If the core is moved a trifling distance during ramming, it will not affect the usability of the casting. Where accuracy of location is essential the usual custom is to attach a core print to the pattern by long pins extending through the print and pattern. The pins hold the core print in place until a sufficient quantity of sand has been rammed around it to hold it firmly in place. The pins then may be withdrawn through the back. After the cope has been lifted off, the core prints are drawn in and the cores inserted in their places.

Using Limestone in the Cupola

Q.—We have a small cupola, 28-in. ID, and run off an average of six casts per month—about 7500-lb heats. Will you advise us concerning the use of limestone in this respect: 600 lb coke is used for the bed, then 1000-lb charges are put in with 150-lb coke splits; slag hole is closed. How much limestone should we use at the beginning of the charge and how much between charges? Should limestone be used only on the original charge or between each charge, and how much? Also should slag hole be open when pouring?

A.—Usual amount of limestone employed in the cupola is 3 per cent of the metal weight between charges and about double that amount on top of the bed. Preferably the limestone is placed near the center—that is, keep it away from the lining. However, it appears to us that with your small cupola it is advisable to use smaller charges than your present ones. We suggest a 500-lb metal charge with 65-lb coke splits. You mention the weight of coke placed on the bed, but you will be much better off by placing it by volume so that the bed is always the same height above the tops of the tuyeres which should be around 36 in.

The slag hole should be opened as soon as the slag rises a few inches above the hole, and left open during the remainder of the heat. You can tell when the slag is above the slag hole by keeping a close watch at the tuyeres after melting starts. Slag hole, of course, should be opened before the slag reaches the tuyeres.

With a constant bed and melting rate, you can determine the time to open the slag hole by calculation. For example, if the slag hole is 12 in. above the bottom, the volume is 7380 cu in. of which about 60 per cent is occupied by coke, leaving 2952 cu in. for iron. Iron weighs about 0.26-lb per cu in. so the amount of iron would be 767.5 lb. If the cupola is melting at the rate of 2½ tons per hr or 83 lb per minute, the time required would be about 9¼ minutes. Hence, between 10 and 11 minutes after the iron starts melting the slag hole could be opened. If the iron takes 8 to 10 minutes after the wind is turned on to show a good stream of hot metal at the spout before botting up, then you could use the time element alone, and open the slag hole 18 to 21 minutes after the wind is turned on.

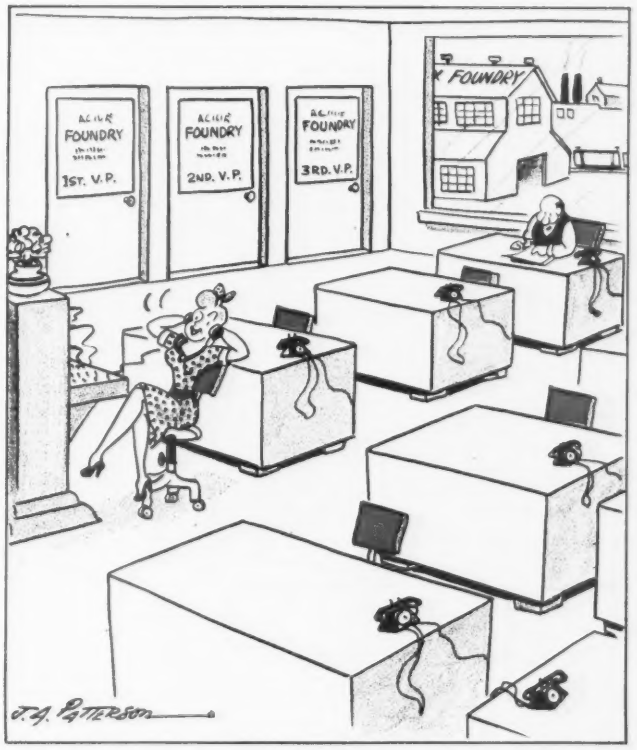
Wants To Avoid Making Chills

Q.—We used chilled rim trolley wheels in some of our equipment but not in any volume. We would like to eliminate the necessity of making chills for each different size wheel since their cost is a considerable portion of the total cost. Can you make any suggestion as to what cast iron mixture might be used which would give about the same life on trolley or crane wheels as a chilled rim wheel?

A.—We do not know of any gray iron composition, plain or alloyed, which will give the same service as chilled tread wheels. You could alleviate your prob-

GANGWAY!

By J. A. PATTERSON



"No, sir, he's gone to the convention in Atlantic City, too—Want to try your luck once more?"

QUESTIONS and Answers

lem to some extent by standardizing on a few wheel sizes rather than a large number since, as you mention, the cost of the chills adds considerably to the price when only a few wheels are desired.

One method would be to use a low-alloy gray iron and flame or induction harden the flange and tread—but that would mean purchasing the necessary equipment to perform the work. Another possibility, which would require some experimental work to develop correct practice, would be to apply a coating of tellurium powder or a tellurium wash to the mold faces of flange and tread. The tellurium would cause the iron to chill at the point of contact.

Has Trouble With Sand Cracks

Q.—We are having considerable trouble in making cast aluminum alloy plates $\frac{5}{8}$ x 18 x 24-in. in that they show sand cracks.

A.—Sand cracks are the result of expansion and/or contraction, and the remedy is to adjust the molding sand characteristics to minimize their effects. Possibly your flask equipment may not be rigid enough, or warped sufficiently to cause cracks to develop in the mold face in handling from pattern to pouring station. Your trouble may be due to hard ramming which, by forcing the sand grains closer together, does not allow room for expansion and results in squeezing out a ridge of sand on the mold face. Too much fines in the sand cuts down the expansion area in the sand, as does low clay content.

Low clay content, resulting in a "weak" sand, usually leads to hard ramming on the molder's part to make the mold face "hold up," so it might be advisable to look into that phase first. If the sand cracks appear only around the gate area, it is an indication that the sand is being overheated, and more gates should be used to decrease the amount of molten metal flowing over any one area.

Wants Double Row of Tuyeres

Q.—Due to the poor quality of coke we have been receiving in our foundry in Mexico, we are thinking about experimenting with a double row of tuyeres in our 27 and 32-in. ID cupolas. Present tuyeres are continuous; four 3 x 6 x 3 x 14½ in. for the 27-in. cupola, and six 4 x 7½ x 4 x 14½ in. for the 32-in. cupola. Please advise what size and shape you would recommend for the second row of tuyeres, and how high they should be placed above the first row. What would you recommend as the most practical heights of the tuyeres above the sand bottom, and the heights of the charging doors above the tuyeres?

A.—Tuyere sizes at the shell opening into the windbox recommended for your cupolas are: Four tuyeres 5 in. high and 7 in. wide for the 27-in. cupola, and four tuyeres 5 in. high and 10 in. wide for the 32-in. unit. In both cases the tuyeres should be located as follows: Bottom of tuyere 18 in. from door; sand bottom average depth 4 in.; slag hole 3 in. below tuyere, and actual well depth 11 in.

Those dimensions are based on the assumption that the cupolas are slagged from the rear. Slag hole should be 1½ in. in diam. Also in both cases a practical operating height of the cupola should be approximately 15 ft from the bottom doors to charging door. A lesser height would be poor economy due to increased fuel costs and the tendency to produce cold metal.

A second row of tuyeres will not improve operation with poor coke. Benefits derived from using two rows of tuyeres are debatable. When using two rows of tuyeres it is absolutely necessary to increase the bed height to avoid oxidation. Increased bed height, if maintained by increasing the coke charge, will result in higher metal temperatures, but at the expense of higher coke costs and slower melting rates. Better overall results can be obtained by using a single row of tuyeres of the proper dimensions as shown.

Poor coke can be improved materially in the shop itself by screening out the fines. For small cupolas it is suggested that all coke less than 2-in. size be removed by screening, using an ordinary fork with every other tine removed. Coke removed can be used for salamanders, boilers, etc. Actually the small coke screened out does not represent a loss because the improvement in permeability of the coke bed will invariably permit a reduction in the coke used per charge with better results in metal temperature, compositon and melting rate.

Green Sand Soil Pipe Cores

Q.—We shall appreciate information on the operation of a special device for making green sand cores for soil pipe castings. Is it necessary to use a special sand mixture? How many strands or sizes of string should be wound around the arbor? What is the proper thickness of sand that is swept on the arbor?

A.—In the green sand core machine for making soil pipe cores the sand falls from a height of 4 to 5 ft through a V-shaped hopper and onto the full length of a rotating arbor, which may be an iron casting or a length of steel pipe. As the sand builds up on the arbor, a horizontal core knife strikes off the excess and forms the shape of the core. The knife can be adjusted to insure the proper amount of sand on the arbor.

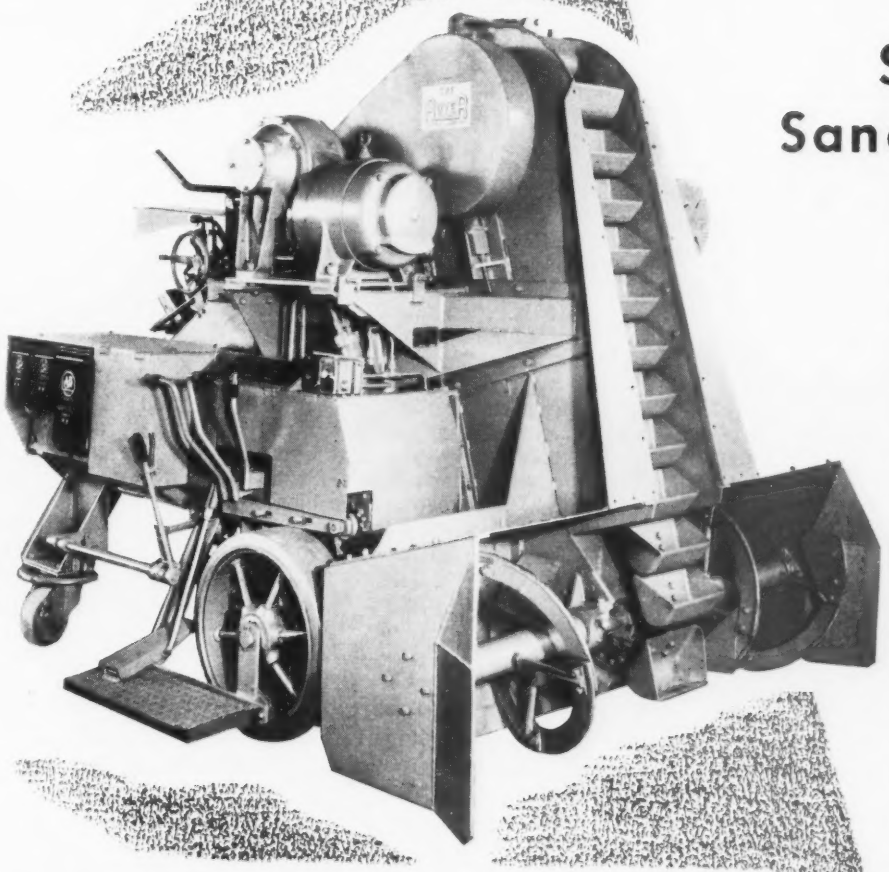
Satisfactory sand for a core of this type will show the following physical characteristics: Permeability 100-110; moisture 5 per cent; green compression 2.5-3.00 psi; dry compression 15.0-22.0 psi; clay 8 per cent; AFS grain fineness 80. A typical batch might contain 1200 lb sand (3 per cent clay, grain fineness 64); 30 lb sand (20 per cent clay, grain fineness 100); 300 lb burnt core sand and 8 lb southern bentonite. In several places a natural sand is available.

The sand should be just strong enough to insure against core drops and to facilitate core arbor removal. The arbor is enlarged at the bell end. For a double bell pipe a collar is placed around the single

(*Concluded on page* 172)

completely mechanized sand preparation

with the new ROYER Self Loading Self Propelled Sand Conditioner



This new hydraulically powered Royer Model RPL-R Sand Conditioner gives you completely mechanized sand preparation. Moving into the sand heap under its own power, it scoops up, completely conditions and discharges from 40 to 60 tons of fluffy, trash free molding sand per hour. In one complete operation the sand is thoroughly mixed, blended and aerated . . . **magnetic separation** removes all tramp iron and small scrap.

Time-consuming, back-breaking labor is entirely eliminated with a consequent saving in labor costs . . . and the properly prepared sand helps to make true-to-pattern molds, greatly reducing rejects and cleaning and grinding time.

You will profit with a Royer —write for further information on this self loading, self propelled model.

NEW MODEL RPL-R FEATURES . . . . .

1. HYDRAULIC PROPULSION . . . Propelled by a hydraulic system, it has a wide range of variable speeds to 100' per minute and is protected against shock or overload.

2. MAGNETIC SEPARATION . . . Sand is conveyed over a magnetic pulley where all small scrap, shot, fines and tramp iron are removed. This additional magnetic separation assures you of molding sand free of all contamination.

3. CAPACITY . . . 40 to 60 tons of sand per hour can be properly and thoroughly conditioned.

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

FOREMOST IN SAND CONDITIONING EQUIPMENT

QUESTIONS and Answers

(*Concluded from page* 170)

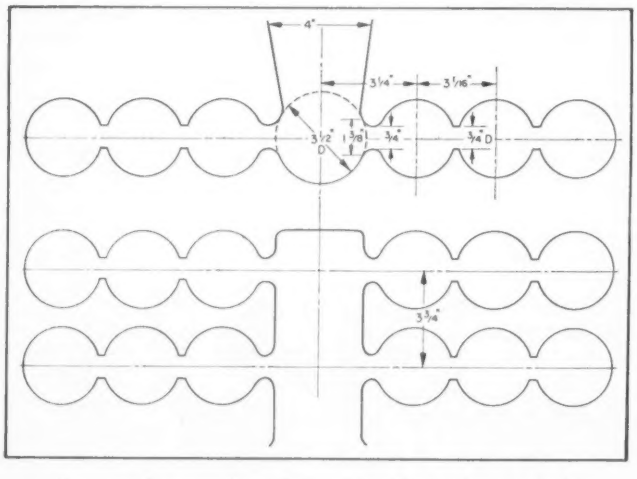
end of the arbor and fastened with a wedge. After the pipe is cast the wedge is knocked out, the collar is removed and the arbor is extracted through the opposite end of the pipe. No string is wound around green sand soil pipe core arbors. The arbor is brushed or sprayed with a thin clay wash. Thickness of sand on the arbor should be just enough to prevent chilling of the metal, and to facilitate removal of the arbor. The arbor should be vented properly to allow gas and steam to escape readily.

Ball Castings Are Not Solid

Q.—In our foundry located in France we are making grinding balls of "Ni-Hard" (4 per cent Ni-1.50 per cent Cr alloy), and have considerable trouble with shrinkage. We believe it is due to the gating system employed, and we would appreciate information on design of the pattern showing location of sprue, runner, gates, heads, etc., for balls 3 in. in diam.

A.—Production of compact, chunky castings free from shrinkage probably is one of the most difficult operations in the foundry since they are hard to feed unless a large riser, practically an extension of the casting, can be applied. In the case of cylindrical and cubical shape castings such extensions are made, and the excess containing the shrinkage void is removed. To facilitate removal of such extensions, use often is made of "breaker," "neck-down" or "cut-off" cores inserted at the junction of the casting proper and the extension or riser. Such thin cores, while having much smaller openings than the area of casting or riser, create "hot spots" which keep the metal fluid and permit it to flow through the opening.

With spherical objects, such as the grinding balls you are making, the extension riser cannot be used very well although it is possible by means of a core shaped to fit the contour. However, an approach to "hot spot" conditions without use of special cores can be made as shown in the accompanying sketch, by employing a very short connection between adjoining balls. Feeding is accomplished from the runner which, as you will note, is quite heavy. Various dimensions are included relative to spacing. We have indicated three balls on each side of the runner since we believe that is all that can be fed properly, but you could try adding another with same spacing to see whether it will work satisfactorily. However, that will require a wider flask, say 32 in. instead of 26 in. Number of rows of balls is not indicated, but we suggest six with the sprue or downgate in the center—between the third and fourth rows. While not indicated, we believe a cope flask 5 in. deep should give sufficient sprue height, but it can be changed.



Proposed procedure for gating hard iron grinding balls so that solid castings are obtained

It should be pointed out that the sketch of the gating system is only a suggestion from which to begin, and you probably may be able to improve on it after trying it out. For example, it may be possible to reduce the size of the runner, and thus increase the yield, or as previously mentioned, add another ball to the row, or perhaps even do both.

Sulphur Content Is Too High

Q.—The sulphur content in our gray iron castings varies to a considerable extent, from 0.16 to 0.32 per cent. Our cupola practice, including the charge material, is approximately the same from day to day. We shall appreciate your opinion on the cause of this wide variation and, more important, how to eliminate it. The cupola is 17 in. diam inside the lining with two rows of tuyeres, four tuyeres in each row. The iron flows through a siphon brick inside the breast and then through the tap hole. The 200-lb cupola charge is made up of pig iron 33 per cent; purchased scrap 33.3 per cent; return scrap 33.3 per cent; coke 12 per cent; limestone 3 per cent. Coke varies in size between 2 and 3 in., with sulphur content 1.7 per cent. The blast is heated and enters the cupola at a temperature between 482 and 572°F, and in volume 636 cfm. Iron is tapped from the cupola at the rate of 2300 lb per hour and at a temperature that ranges between 2500 and 2600°F. Typical analysis shows 3.50c, 0.60 Mn and 2.5 Si.

A.—Iron melted in the cupola absorbs sulphur from the coke. Iron will absorb more sulphur from high-sulphur coke than from low-sulphur coke. Each time iron is remelted the sulphur content is increased to some extent, but with constant amounts of pig iron, return scrap and purchased scrap, the sulphur content eventually should level off at some narrow range.

Your present pig iron may show a uniform and satisfactory sulphur content from day to day. This is not true for the purchased scrap, and for the returns from the previous day's heat. Thus you have one-third of the charge on which you can depend. The remaining two-thirds, miscellaneous and shop scrap, may vary in wide limits. Possibly your coke may vary in sulphur content. Consequently, the resulting castings also will show wide variation in sulphur content. An experienced man might select enough scrap for the charge and still keep within a prescribed sulphur content specification. Otherwise, if a quick test shows the iron in the ladle has a high sulphur content, the metal should be desulphurized by the addition of soda ash.

PROGRESS REPORTS FAVOR EXTENDED USE OF NATIONAL CARBON IN BLAST FURNACES

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● The future of "National" carbon as a preferred material for blast furnace linings is definitely assured by the mounting evidence of its extra long life in hearths and, more recently, in side walls all the way up to the mantle.

Already, indications are that, as carbon goes *up* the furnace, operating costs come *down*. Fewer shut-downs, more uniform casts are consistently being obtained in existing installations. And increased capacity can be expected to result from the use of thinner wall sections, made possible by this ideal furnace-lining material.

Furnace operators are urged to keep their eyes on carbon and on the growing body of data covering its use in modern, high-tonnage-life furnaces.

WHY BUY THIS ITEM?

It gives you *double the usable light!*
No metal can to *leak or corrode!*
It can't *stick, swell or jam!*
It delivers the *whitest, brightest light!*

It's the "Eveready" No. 1050 flashlight battery, made with the zinc electrode inside a carbon jacket – just the reverse of every other battery on the market.

Test it and . . . you always buy it!

OTHER NATIONAL CARBON PRODUCTS

BLAST FURNACE LININGS • BRICK • CINDER NOTCH LINERS • CINDER NOTCH PLUGS • SKIMMER BLOCKS • SPLASH PLATES • RUNOUT TROUGH LINERS • MOLD PLUGS • TANK HEATERS

MEN
of Industry

CARL H. MORKEN has been appointed works manager, the Kennedy Valve Mfg. Co., Elmira, N. Y., which operates foundries in that city and Jeannette, Pa. Mr. Morken has been engaged in foundry consultation work for several years and during 1950-51 was works manager, Donovan Inc., St. Paul. Prior to that he was general superintendent, Sterling Casting Corp., Bluffton, Ind., and general superintendent, Carondelet Foundry Co., St. Louis. Mr. Morken is a former chairman of the St. Louis District Chapter of the American Foundrymen's Society.

♦ ♦ ♦

Robert C. Becherer has been named president and a director, Link-Belt Co., Chicago, succeeding the former president, **George P. Torrence,** who continues as a director and member of the executive committee following his retirement, **William J. Kelly,** president, Machinery & Allied Products Institute has been named a director also. Other directors were re-elected. Mr. Becherer was graduated from Purdue University and joined Link-Belt in 1923. He became general manager of the Ewart plant in Indianapolis in 1947 and was elected vice president in 1951, becoming executive vice president later in the year.

♦ ♦ ♦

Harold E. Pridmore, 20 Washington Circle, Hinsdale, Ill., formerly president, International Molding Machine Co., recently established his own service to the foundry industry as an analyst specializing in pattern equipment, molding problems, special molding machine design and automatic cycle control. Mr. Pridmore studied mechanical engineering at the University of Wisconsin. In 1926 he became an apprentice molder with the Lindgren Foundry Co., Batavia, Ill., and in 1928 joined his father, the late E. A. Pridmore, in the International Molding Machine Co. On the death of his father in 1943, he was made president. Much of his work with that organization concerned the designing of molding machines and the study of core-making and foundry problems.

♦ ♦ ♦

Charles E. Walker has been named vice president of engineering and operations, Vulcan Mold & Iron Co., Latrobe, Pa. Mr. Walker was graduated from University of Akron in 1931, when he joined the Cleveland plant of American Steel & Wire Co. Twelve years later he became plant engineer at Vulcan Mold's home office in Latrobe and in 1945 was named general superintendent. Last year he was appointed manager of production and engineering for the Latrobe and the Lansing, Ill., plants.

♦ ♦ ♦

Thomas A. Jones has been elected president, W. A. Jones Foundry & Machine Co., Chicago, and **Frederick H. Hoge** has been named chairman of the board. **Robert B. Moir** is now vice president-engineering, **Joseph A. Marland,** vice president-sales and service, **James B. Christerson,** vice president-treasurer, and **Robert E. Whiteway,** secretary-production manager. Mr. Jones, grandson of W. A. Jones, who founded the company in 1890, entered the organization following graduation from Yale University. He was formerly personnel manager, secretary, assistant sales manager and vice president. Mr. Marland has been with the company since 1926.

♦ ♦ ♦

Thomas R. Walker Jr. has resigned as director and vice president in charge of pipe production, Warren Foundry & Pipe Corp., New York.

♦ ♦ ♦

W. J. Sparling has been appointed vice president and manager of oper-

(*Continued on page* 176)

CARL H. MORKEN
. . . Kennedy Valve works mgr.

ROBERT C. BECHERER
. . . heads Link-Belt Co.

HAROLD E. PRIDMORE
. . . foundry analyst

CHARLES E. WALKER
. . . vice pres., Vulcan Mold

The wrong selection can be costly in golf . . . or grinding. When you select Bay State Mounted Wheels and Points, you can be sure of getting abrasive products that are:

- **FAST CUTTING** — Whatever your casting, there's a fast-cutting, economical Bay State point to grind it. All grits, grades and bonds are available.
- **RUGGED — STRONG** — Points are trued-to-shape on the spindles — thereby proving a positive adhesion of abrasive to spindle.
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To help you select quickly the right shape, grit and grade for your job, call for Bay State's Engineering Service or send for Handbook W.P.4.

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MEN of Industry

(*Continued from page* 174)

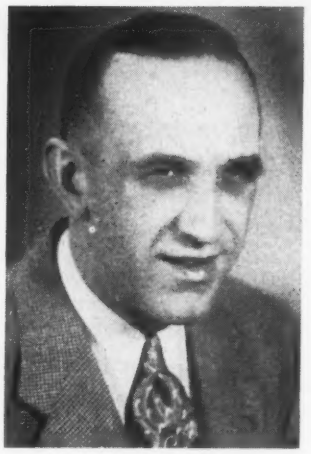
ations, Chain Belt Co., Milwaukee, in charge of construction machinery, conveyor and process equipment divisions. Mr. Sparling, a graduate of Michigan State College, joined the company in 1928 and recently was vice president and manager of the chain and power transmission, and **M. G. Jewett** has been appointed manager, chain and power transmission division. Also a graduate of Michigan State, he joined Chain Belt Co. in 1927 as a research engineer. He served in engineering and metallurgy departments of the company, and until his new appointment was chief engineer, chain and power transmission division.

♦ ♦ ♦

Paul J. Scherbner has been named superintendent of the nonferrous foundry department, Winters Foundry & Machine Co., Canton, O., where he will direct fabrication and control of aircraft aluminum and bronze castings. Mr. Scherbner entered the foundry industry at the Eclipse Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., and later became general foreman, Stamford Casting Co., Stamford, Conn. In 1948 he was named foundry metallurgist, Sperry Gyroscope Corp., Great Neck, L. I.

♦ ♦ ♦

Thomas W. Curry, until recently plant metallurgist, Lynchburg Foundry Co., Lynchburg, Va., has been made director of manufacturing research and methods. Mr. Curry, graduated from Pennsylvania State College in 1932, has been with the Lynchburg company since 1943. A year ago he was awarded the Peter L. Simpson Medal of the American Foundrymen's Society.



ORTON W. STREET
. . . *Parker-Street supt.*

GORDON A. WILTSE
. . . *gen. mgr., Parker-Street*

Gordon A. Wiltse has been appointed general manager of the Parker-Street Castings Co., Cleveland, succeeding **H. R. Street,** who will continue as president. Mr. Street has also been elected chairman of the board. Mr. Wiltse, who joined the foundry 23 years ago, has been a director for several years. **Orton W. Street,** who has been associated with the company since graduation from Findlay College in 1940, has been named general superintendent.

♦ ♦ ♦

Leslie B. Bellamy, Detroit manager, Sterling Grinding Wheel Division, Cleveland Quarries Co., Cleveland, was elected president of the American Society of Tool Engineers for 1952-53, succeeding **J. J. Demuth** of National Production Authority, Washington.

♦ ♦ ♦

Thomas L. Keeler has been appointed industrial specialist in the Castings Section, Iron and Steel Division, National Production Authority, Washington. Mr. Keeler was graduated from University of Pennsylvania and from 1942 until recently he was with Lebanon Steel Foundry, Lebanon, Pa. Prior to that he was associated with the former Eagan-Rogers Steel & Iron Co., and Dodge Steel Co., Philadelphia.

♦ ♦ ♦

Arthur H. Nelson has been appointed Chicago manager of electric tool sales, Independent Pneumatic Tool Co., Aurora, Ill. Mr. Nelson has been one of the company's service engineers for several years.

♦ ♦ ♦

L. C. McKessen, vice president in charge of sales, the Ansul Chemical Co., Marinette, Wis., was recently elected president of the Fire Equipment Manufacturers' Association.

♦ ♦ ♦

Jess W. Eyler has joined the sales staff of J. K. Mahaffey & Son, Pittsburgh representative of Baker Industrial Truck Division, Baker-Raulang Co., Cleveland. Previously Mr. Eyler was a materials handling engineer at the Westinghouse Air Brake Co., Wilmerding, Pa. **Alfred E. Dorod** and **Richard T. Tiebout** have been added to the company's staff of field engineers.

♦ ♦ ♦

Alfred H. Hesse has been made vice president-general manager, Stemac Inc., Chicago, producer of electrical parts and aluminum and bronze castings. Mr. Hesse, a graduate of Missouri School of Mines and Metallurgy, was associated for 6 years with R. Lavin & Sons, Chicago, as metallurgist and advertising manager. He was previously affiliated with Battelle Memorial Institute and Naval Research Laboratory.

♦ ♦ ♦

Charles E. O'Connor has been appointed coreroom superintendent.

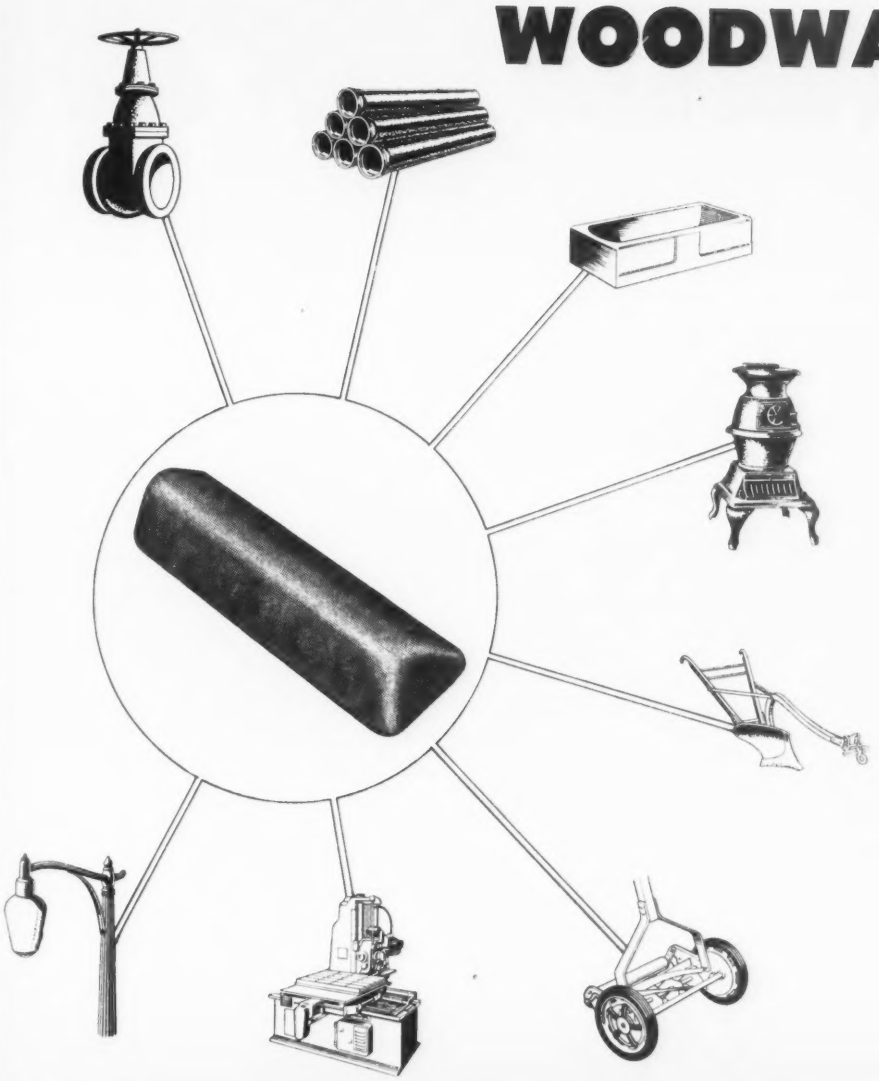
(*Continued on page* 178)

PAUL J. SCHERBNER
. . . *Winters Foundry supt.*

THOMAS W. CURRY
. . . *Lynchburg Fdy. research*

for Uniformity in Castings Specify Uniform

WOODWARD IRON



FOUNDRIES, particular about uniformity in their castings, appreciate the importance of using pig iron made from an identical ore base. Woodward Iron's consistent uniformity is due in large part to the fact that Woodward's base ore burden is always from the same ore body—plus the use of an air conditioned blast to reduce and control moisture.

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MEN of Industry

(*Continued from page* 176)

Tractor Works, International Harvester Co., Chicago. For the last year Mr. O'Connor has been associated with Aircraft Engine Division, Ford Motor Co., Chicago, as foundry process engineer. Prior to that he was a member of his father's organization, O'Connor Equipment Co., as sales representative of International Molding Machine Co. He attended St. Mary's College and previously was a student foundry apprentice at International Harvester Co., where he became foundry and coreroom foreman.

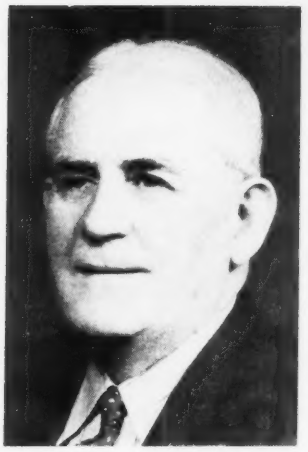
♦ ♦ ♦

Vernon L. Johnson, for the last 6 years special assistant to the vice president in charge of the parts and accessories division, Studebaker Corp., South Bend, Ind., has been named regional sales manager, Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. Mr. Johnson was graduated from University of Illinois and was previously consulting engineer, Bellton Engineering Co., Chicago, and industrial engineer, Todd & Brown, New York, in its Kingsbury, Ind., Ordnance Plant.

♦ ♦ ♦

Dr. Walter A. Dean, chief metallurgist at the Cleveland Works of Aluminum Co. of America, has been elected chairman of the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. Dr. Dean joined Alcoa's Research Division in 1929 at the New Kensington, Pa., laboratories, became associated with the Cleveland operations in 1931 and was made chief metallurgist a year ago.

WENDELL P. McKOWN JR.
. . . works mgr., Cooper Alloy



JOHN C. TIRRELL
. . . 60-yr foundry veteran

Wendell P. McKown Jr., for the last 10 years purchasing agent, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn., has been appointed works manager, the Cooper Alloy Foundry Co., Hillside, N. J. A graduate of Bowdoin College, Mr. McKown has had broad experience in administrative and organizational work.

♦ ♦ ♦

John C. Tirrell has retired as general foundry foreman, Warren Foundry & Pipe Corp., Phillipsburg, N. J., following 60 years of service. He was recently honored at a dinner sponsored by the local area Foremen's Club as the local employee with the longest continuous service with any company. Upon his retirement Warren Foundry tendered him a dinner meeting of executive, administrative and supervisory personnel.

♦ ♦ ♦

Norman A. Matthews, formerly metallurgist, Electro-Alloys Division of American Brake Shoe Co., in Elyria, O., has been appointed assistant chief metallurgist of the company's metallurgical research department, Mahwah, N. J. A graduate of Massachusetts Institute of Technology, he joined the company in 1946.

♦ ♦ ♦

Paul Mayfield, general manager of the Naval Stores Department, Hercules Powder Co., Wilmington, Del., was recently named a director of the company.

♦ ♦ ♦

L. R. Foote, since 1946 eastern sales representative, Bryant Heater Division, Affiliated Gas Equipment Inc., Cleveland, has been appointed national sales representative for combustion equipment made by the company. Mr. Foote will continue to maintain his New York area office in Yonkers.

♦ ♦ ♦

Malcolm D. Shaffner, formerly vice president-treasurer-secretary, Saco-Lowell Shops, Boston, has been appointed executive vice president. Mr. Shaffner, who has been with the company since 1933, will continue as treasurer and a director. He is also president of Saco-Lowell's subsidiary, the Pawtucket Spinning Ring Co.

♦ ♦ ♦

Dr. Ralph G. Owens, for the last year assistant dean of engineering, Illinois Institute of Technology, has been named dean of engineering. Dr. Owens was graduated from Ohio State University and received his doctorate in 1939 from University of Michigan. He taught at various colleges until 1943 when he joined Armour Research Foundation and became associated with I.I.T. in 1946.

♦ ♦ ♦

H. J. Morrison has been appointed assistant works manager for the Cleveland operations of Aluminum Co. of America. **R. F. Bell** has succeeded

(*Continued on page* 180)

VERNON L. JOHNSON
. . . Clark Equipment sales

DR. WALTER A. DEAN
. . . heads AIME Metals Div.

Let air give your production problems a lift

Let air power's tireless muscles do the heavy work in your foundry. Let *compressed air* be the force that lifts heavy castings . . . that puts molds where you want them . . . that opens or shuts chutes for molding sand . . . or numerous other applications.

Air is quick . . . convenient . . . economical. With Schrader Air Cylinders, air gives you a push . . . or pull . . . or push *and* pull with less work than any other method you've ever tried.

You'll find Schrader Air Cylinders ideal for any application where you need straight-line forces for any distance from inches to feet . . . at forces from less than 20 pounds to over 5,000 pounds.

So, wherever you need quick, sure lifting, lowering, pushing or pulling—whether you want to tilt a furnace or position a mold—see how Schrader Air Cylinders and Operating Valves can help you do it better . . . faster.

We'll be glad to give you specific help for your foundry problems. Write, describing your installation, your idea—or fill out the coupon below.

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Company_____

Address_____

MEN of Industry

(*Continued from page* 178)

Mr. Morrison as manager of the Cleveland Forge Plant and **W. S. Mayes** has assumed Mr. Bell's former duties as forge plant superintendent. Mr. Morrison was graduated from Pennsylvania State College, and joined Alcoa in 1929. He managed the company's forging operations in New Castle, Pa., during World War II and became manager of the Cleveland forge plant in 1944.

♦ ♦ ♦

Lawrence D. Pridmore has been elected president and treasurer of the International Molding Machine Co., La Grange Park, Ill. **Harry James Jr.** has been named vice president and **T. B. Eichler** secretary.

♦ ♦ ♦

James M. Robertson, formerly head of the laboratory, Wellman Bronze & Aluminum Co., Cleveland, has been appointed chief chemist in charge of quality control. Mr. Robertson, a graduate of Wittenberg College, did postgraduate work at Western Reserve University and joined Wellman Bronze 10 years ago. **Robert C. Boehm** has been named Wellman's chief metallurgist. Mr. Boehm was graduated from Case Institute of Technology and for the last 6 years has been in castings research with Aluminum Co. of America, Cleveland. Prior to that he was metallurgist, the Ohio Crankshaft Co., Cleveland. **Robert W. Spacek,** who has been in estimating and production scheduling work with Wellman for over a year and a half, has been named assistant production manager for all plants. Mr. Spacek was graduated from Ohio State University and has done post graduate work at Case Institute of Technology.

♦ ♦ ♦

William H. Steinkamp has been appointed sales manager, industrial division of Minneapolis - Honeywell Regulator Co., Brown Instruments Division, succeeding **L. Morton Morley** who, continuing as vice president of the division will assume greater division responsibilities. Mr. Steinkamp, a graduate of New York University, joined the Brown division in 1930 as field sales engineer and formerly represented it in New York, Buffalo, Cleveland and Pittsburgh. He has been industrial field sales manager since 1943.

♦ ♦ ♦

Kenneth M. Morse, until recently program director, Safety and Hygiene and Air Pollution, American Foundrymen's Society, Chicago, has been appointed industrial hygienist, United States Steel Co., Pittsburgh. Before joining the AFS he was chief engineer and chief of the industrial hygiene division, state of Illinois.

♦ ♦ ♦

Walter J. Dahl has been appointed to the sales engineering staff of the Baker Industrial Truck Co. of Illiana, Chicago area distributor for Baker-Raulang Co., Cleveland. Until recently Mr. Dahl was a sales representative in that area for Hyster Co., Portland, Oreg.

♦ ♦ ♦

I. Melville Stein, executive vice president, Leeds & Northrup Co., Philadelphia, has been named a Fellow of the American Society of Mechanical Engineers. Mr. Stein, former associate of the late Thomas A. Edison, became director of research for Leeds & Northrup in 1928, vice president in 1944 and last year executive vice president.

HAL LENNON
. . . Lavin mgr., Pittsburgh

Hal Lennon, formerly in the Chicago sales and purchasing departments, R. Lavin & Sons Inc., producer of zinc-base die casting alloys, has been appointed manager of the Pittsburgh division, which includes Pennsylvania, New York and West Virginia. Mr. Lennon completed his studies at Roosevelt College following World War II and has been in the nonferrous metals field since that time.

♦ ♦ ♦

Jesse W. Rosenquist has been named representative of Mine Safety Appliances Co., Pittsburgh, in Maine, New Hampshire, Vermont and part of Massachusetts. He joined the company following graduation from Loyola University, Los Angeles.

♦ ♦ ♦

C. Dale Dickinson, research engineer, Allis-Chalmers Mfg. Co., Milwaukee, has been awarded a year of residence study in metallurgical engineering by the company at University of Michigan. Mr. Dickinson

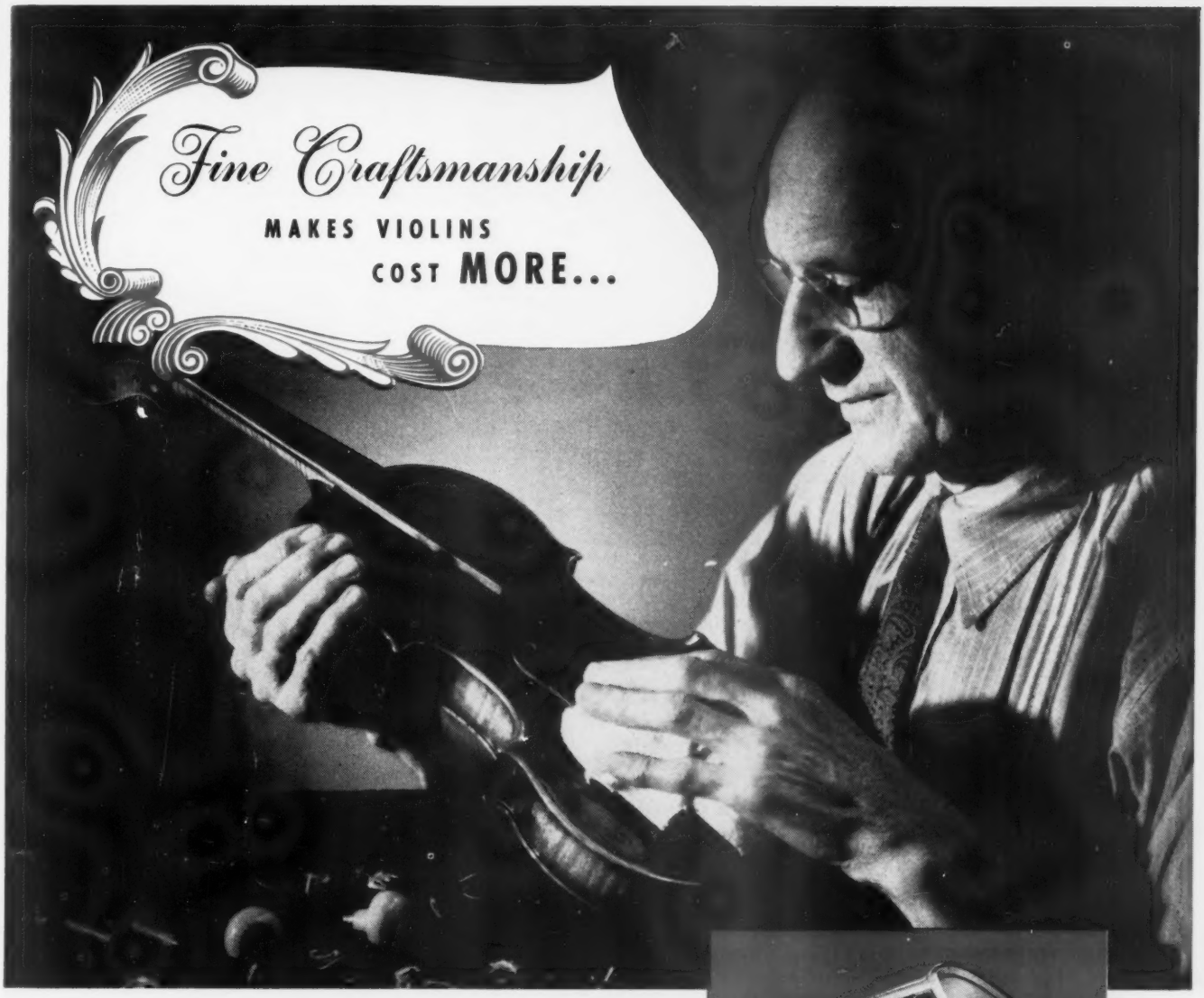
(*Concluded on page* 182)

LAWRENCE D. PRIDMORE
. . . International pres.

JAMES M. ROBERTSON
. . . Wellman Bronze chemist

ROBERT C. BOEHM
. . . chief metallurgist, Wellman

ROBERT W. SPACEK
. . . Wellman assistant mgr.



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The skilled hands, the infinite patience and the justifiable pride in a job well done are ingredients necessary to the production of a fine and costly violin. And . . . it's pretty much the same in our production of fine pattern equipment *with one important exception.* Yes, the kind of craftsmanship we're talking about, still exists here at Buffalo Pattern and has for over half a century. The pride, the patience and the precision, of minds, hands and tools are all here. Now, as in the past, they are busy producing top-notch pattern equipment for particular people everywhere.

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This quality magnesium casting for an aircraft engine was molded from a precision Buffalo Pattern. It's a large casting (Approx. 42" in diameter and 24" high) of developed contours and the problem of retaining very thin metal walls was really tough. Well, we did it, and the minimum of scrap on this one will pay for the equipment many times over.

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DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

MEN of Industry

(*Concluded from page* 180)

received his bachelor's degree in metallurgical engineering from Purdue University in 1950 and his master's degree there last year.

♦ ♦ ♦

Arthur C. Buesing has joined Modern Equipment Co., Port Washington, Wis., as sales engineer. For the last 10 years Mr. Buesing was metallurgist and manager of the Greensburg, Ind., plant of the Williamson Heater Co., Cincinnati. Prior to that he was associated with Maddox Foundry & Machine Works Inc., Archer, Fla., and General Motors Corp.

♦ ♦ ♦

W. E. Todd has been appointed southern manager for Pre-Engineered Division, Mechanical Handling Systems Inc., Detroit. Mr. Todd has his office in Cincinnati and until recently managed conveyor sales through manufacturers' representatives for Alvey Ferguson Co. and later E. W. Buschman Co., there.

♦ ♦ ♦

L. H. Stott has been named vice president and manager of engineering, Robert W. Hunt Co., Engineers, Chicago, succeeding the late D. W. McNaugher Jr. **S. C. Sexauer** is secretary-treasurer and **W. F. Anderson,** assistant secretary-treasurer.

♦ ♦ ♦

Donald Gaertner has been appointed works manager, Albion Malleable Iron Co., Albion, Mich., succeeding **Donald Champion,** resigned. Mr. Gaertner, formerly foundry superintendent, joined the company in 1949. Prior to that he was associated for 12 years with Central Foundry Division, General Motors Corp., Saginaw, Mich., where he was a coremaker, foreman and superintendent of the melting and shipping departments. For two years he was superintendent of GMC's Lockport, N. Y., gray iron foundry, and later coreroom superintendent at its Defiance, O., plant.

GARVIN A. DREW
. . . Scovill Co. executive

PHILLIP SPRAGUE JR.
. . . vice pres., Hays Corp.

♦ ♦ ♦

Garvin A. Drew has been appointed assistant vice president, Scovill Mfg. Co., Brooklyn, N. Y., continuing as general sales manager of its A. Schrader's Son Division. Mr. Drew joined the company in 1925, following graduation from Massachusetts Institute of Technology. He has been general sales manager since 1940.

* * *

Phillip Sprague Jr. has been appointed executive vice president, the Hays Corp., Michigan City, Ind., maker of combustion instruments and controls. Mr. Sprague, a graduate of Beloit College and Harvard Business School, has been advertising manager for several years. **Paul B. LeBoeuf** has succeeded Mr. Sprague as advertising manager. He was previously associated with A. O. Smith Corp., Water Heater Division, Kankakee, Ill.

♦ ♦ ♦

George Krska has been appointed superintendent of the pattern department, Aircraft Engine Division, Ford Motor Co., Chicago. Mr. Krska joined the division early in 1951 and until recently has been a supervisory engineer there. **S'mon Ryan,** for the last year a general foreman in the coremaking department, has been named superintendent of core assembly. Mr. Ryan became associated with the pattern department as a precision casting engineer in 1951.

♦ ♦ ♦

Arthur H. Bunker, president, Climax Molybdenum Co., New York, has been named a member of the industrial council recently organized at Rensselaer Polytechnic Institute to undertake a study of the role of industry in economic development.

♦ ♦ ♦

Paul De Rienzo, now associated with Wright Aeronautical Division, Curtiss-Wright Corp., Wood-Ridge, N. J., is senior metallurgist directing foundry research and development operations in shell molding and investment casting with particular application to high temperature alloys.

♦ ♦ ♦

James B. Austin, director of research, United States Steel Corp., has been chosen to present the Edward Orton Jr. Fellow Lecture at the 54th annual meeting of the American Ceramic Society in Pittsburgh. Dr. Austin, a member of the society since 1935, will discuss "The Thermal Expansion of Nonmetallic Crystals." He was graduated from Lehigh University in 1925 and received his Ph. D. degree in chemistry from Yale University in 1928, when he joined the research laboratories of U. S. Steel.

ARTHUR C. BUESING
. . . joins Modern Equipment Co.

W. E. TODD
. . . mechanical handling sales

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Steel Founders' Meeting

Reviews 50 Years of Progress

By FRANK G. STEINEBACH
Editor
FOUNDRY

REVIEW of 50 years of progress in the steel castings industry, and discussions of the tremendous defense mobilization demands that lie ahead, featured the program for the annual meeting of the Steel Founders' Society of America at the Edgewater Beach Hotel, Chicago, Mar. 18-19. This was the Golden Anniversary celebration of the society.

While the growth of the industry and the service of the society was touched on by a number of speakers, the high light of the anniversary celebration took place at the final luncheon, with William H. Worrilow Sr., president, Lebanon Steel Foundry, Lebanon, Pa., as speaker. Flanked by all but three of the living past presidents, Mr. Worrilow, president of the society in 1931, gave a most interesting and entertaining talk on the organization's progress since his first contact with it in 1906. Mr. Worrilow concluded with the observation that selfish motives in the industry have vanished, that the industry is on the verge of tremendous developments, and that at long last steel and alloy steel castings are accorded the recognition they deserve.

During the meeting, copies of the beautiful 50th anniversary booklet were distributed. The better part of this booklet is devoted to the men who have guided the society's progress throughout the years and the events of interest that took place during their administrations. Other features include present officers and directors, a complete list of the society's standing committees, a list of society members, and a discussion of the growth of the steel casting industry the last 50 years.

James Suttie, vice president, American Steel Foundries, Chicago, was honored with the award of the Lorenz Memorial Gold medal of the society for his unselfish interest and devoted effort to practically every activity of the Steel Founders' Society for many years; for his service on practically every national committee formed for the solution of problems affecting the entire foundry industry; and for his sage counsel and constructive service.

Luther A. Kleber, vice president in charge of manufacturing, General Steel Castings Corp., Granite City, Ill., was presented the Technical and Operating Medal for 1951 for his outstanding work for the betterment of the steel castings industry as national technical and operating chairman for the society. Harold H. Johnson, chief metallurgist, National Malleable & Steel Castings Co., Sharon, Pa., received the annual *Steel Foundry Facts* award for excellence of material published in the society's technical publication. His paper entitled, "Statistical Quality Control at Work in the Foundry," also was presented in the July, 1951 issue of FOUNDRY.

JAMES SUTTIE
Lorenz Memorial Gold Medalist

LUTHER A. KLEBER
Technical and Operating Medalist

President Forsberg, in opening the annual meeting, pointed to the growth of the society's research activities. He stressed the need for giving greater attention to product development, undertaking a study of personnel problems, and considering the possibility of employing incentive plans as one means of decreasing costs. Mr. Forsberg also paid tribute to the work of the Foundry Educational Foundation, and asked the industry to continue to back the project.

F. Kermit Donaldson, executive vice president, reported on the progress of the industry and activities of the society during the past year. He stated that production of steel castings to meet expanding defense mobilization requirements is now at a near-record level. Compared with total shipments of 1,460,000 tons in 1950, the 1951 total exceeded 2,100,000 tons. Practically all of the industry's production is being diverted to fulfillment of direct military and closely re-

(*Continued on page* 186)

SFSA OFFICERS: Left to right, Arthur S. Breithaupt, Dodge Steel Co., Philadelphia, director and executive committee member; Carl F. Barchfeld, Commercial Steel Casting Co., Marion, O., vice president; H. A. Forsberg, Continental Foundry & Machine Co., East Chicago, Ind., president; and F. Kermit Donaldson, executive vice president at Cleveland

HOW THIS FOUNDRY GOT SIX PERCENT MORE OUTPUT WITH CLECO BENCH RAMMERS

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DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND THOUGHOUT THE WORLD

3321

(*Continued from page* 184)
lated defense supporting requirements.

Mr. Donaldson outlined the work of the Advertising and Public Relations committee on its business paper advertising and direct mail programs. During the year, 128 leading engineering schools saw the panels on the engineering features of cast steel. These panels now are being rebuilt and will start on a new itinerary with the beginning of the new school year. This program has proved exceptionally successful in interesting college students in cast steel as shown by requests received for literature following the display of the panels.

The Personnel Committee has suggested that top-flight industrial relations subjects be included on the program for the annual and fall meetings of the society, according to Mr. Donaldson. An Industrial Personnel Relations Conference also is being considered. Authorization also has been given for the compilation of a yearly statistical report.

Mr. Donaldson also discussed in some detail the assistance the society has provided various government agencies in connection with the defense mobilization program. He also paid tribute to A. J. McDonald, chief, Castings Section, Iron and Steel Division, NPA, for his service to the ferrous foundry industry in the present emergency.

Charles W. Briggs, technical and research director of the society, reported on the future programs of technical activities. He stated that the technical and operating groups plan consideration of almost every phase of foundry operation in future meetings. The annual conference, held last November, developed a record attendance for the three-day meeting.

Research plans on a number of projects are going forward. These include the following subjects: Determining the distance risers will feed in uniform sections; study of comparative characteristics in steel castings of equivalent structures; endurance properties in fatigue; metal removal and cleaning room practices; fundamental studies of flowability of molding materials; machinability of cast steel; deoxidization and desulphurization of cast steels; steel foundry sand control; flow of molten steel in whirlgates; properties of substitute cast steels; and boron-treated cast steels.

In conclusion, Mr. Briggs mentioned several articles dealing with production of steel castings and early specifications for cast steel which appeared in FOUNDRY in 1902. Judging from these early discussions, the steel castings industry has come a long way the last 50 years.

Discussing the "NPA Control Picture," A. J. McDonald, chief, Castings Section, Iron and Steel Division, NPA, Washington, stated the scrap situation is easing considerably in some sections. Foundries are free to buy any scrap offered as long as it is not allocated. Rail prices vary, due to cost of removing from streets. If the price is not too much out of line, OPS will usually approve.

Mr. McDonald stated that blast furnaces are having little trouble today in taking care of demands, probably due to a slackening in demand from some foundries. However, all iron is being taken up, resulting frequently in an increase in the percentage of pig iron in the charge. It is reported that a revised M-1 order is going through which, among other things, will permit industry to have a 60-day inventory instead of 45 days.

Ferroalloys continue tight, according to Mr. McDonald. Nickel and molybdenum are in short supply, vanadium is in balance, silicon is in good supply, but silvery iron is tight in spots. Chromium is relatively easy and boron is in particularly good shape. Manganese is not regulated by government order. The melt sheet, NPAF 60, is in process of modification.

Mr. McDonald outlined the methods to be followed in making application for ratings for equipment. He referred to the critical situation in cast armor production, and indicated that heavy steel castings may be placed under allocations. An integrating committee is being appointed to deal with the problem of cast armor. In his opinion, the increased demand for steel castings has put aside any possibility of decontrol. In fact, there will be more control of steel castings.

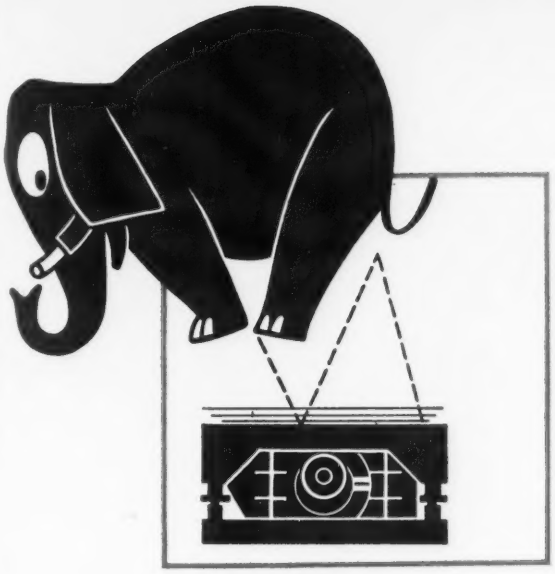
Economics for Supervisors

Ben Bennett, supervisor, Economic Training, Republic Steel Corp., Cleveland, speaking on "Basic Economics—A Basis for Understanding," gave an interesting picture of that company's new course in basic economics for supervisors. The course consists of 15 directed conferences, the first dealing with a general preview of the economy. This was followed by conferences on personal economics and family budgets, wages, prices, costs, profits, production, company economics, products, history, competitive position and national economic problems. Mr. Bennett pointed out that a good job will take time and patience, and the material presented must be factual, objective, and educationally sound. Results from the program have been beyond expectations.

In considering "What's Ahead for American Industry," Harry E. Blythe, special assistant to the Under Secretary of the Army, Washington, discussed the progress made in our standard of living and the increase which has taken place in the demand for products of American Industry. He believes that industry will need to increase productive capacity 75 to 100 per cent the next 25 years to meet the greater demands. Mr. Blythe considered the impact of the mobilization program on the increase in employment, shortages of materials and

(*Concluded on page* 188)

Society presidents, past and present, shown at the Chicago meeting include: top row—Oliver E. Mount, American Steel Foundries, Chicago; Frank M. Robbins, Ross-Meehan Foundries, Chattanooga, Tenn.; A. M. Andorn, Penn Steel Castings Co., Chester, Pa.; Edgar D. Flintermann, Michigan Steel Casting Co., Detroit; F. Kermit Donaldson, SFSA executive vice president. Bottom row—William H. Worrilow, Lebanon Steel Foundry, Lebanon, Pa.; H. A. Forsberg, Continental Foundry & Machine Co., East Chicago, Ind.; John E. McCauley, Birsboro Steel Foundry & Machine Co., Birdsboro, Pa.; T. H. Harvey, Ohio Steel Foundry Co., Lima



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(*Concluded from page* 186)

delays in production. He indicated that the tank program presented a number of production problems which are being studied in an effort to increase output.

Col. Eugene Engler gave an interesting discussion of the problems of the military in planning and procurement. Basic philosophy can follow three main lines, namely keeping ourselves only strong enough to resist aggression; keeping strong enough to deter any nation from starting a conflict; or providing the minimum force necessary to prevent war. He stated that in certain segments of industry, the capacity problem is serious. Decision must be made whether existing facilities will be adequate or if the production base must be broadened. In increasing facilities, finding the special production know-how is a great problem.

Colonel Engler discussed in considerable detail the immediate problems facing the armor program. He indicated several steps are being taken to help increase output, including the production of the hull in smaller castings which are assembled by welding. This will permit many more foundries to participate in the program. Also, in an effort to cut red tape of government procurement, an effort is being made to put responsibility for procurement of armor castings in the hands of the prime contractors. Colonel Engler asked for the help of the entire steel foundry industry in meeting this problem.

Speaking at a luncheon meeting, Frank G. Steinebach, editor, FOUNDRY, paid tribute to the society and the service it has rendered the steel foundry industry and the American economy the past 50 years. He indicated that the membership should take pride in the impressive record of accomplishment and in the many activities which today are helping build better steel castings. Special emphasis was placed on the society's expanded research program, the work of the T and O groups, and the product development program. He paid tribute to the co-operative spirit now permeating the industry, which has developed the ability to produce a better product and provided greater confidence in the place of the steel castings in our scheme of things. This co-operative spirit also has brought about active participation in the discussion of overall foundry industry problems through the National Castings Council.

HAROLD H. JOHNSON
Steel Foundry Facts Award Winner

The progress in steel castings the last half century provides the industry with the foundation for greater service to the American economy and the golden opportunity of meeting the enlarging demands of the future. The expanding economy and the goal of improved standards of living should result in a gradual increase in the demand for steel castings. With this growing demand, and with a basic understanding of what to make and how to make it, the next ten years should provide golden opportunity for the steel castings industry.

Issues New Catalog

Mexico Refractories Co., Mexico, Mo., has issued a new 104-page catalog, "Better Refractories for the Furnaces of Industry." It describes various company brands of firebrick and refractory specialties for use in all types of industrial furnaces. Tables give combinations of brick sizes required to turn circles and to make arches of various rises and spans. A glossary of terms is included.

Meetings of Interest to Foundrymen

May 1-7—American Foundrymen's Society, International Foundry Congress & Show, Atlantic City, N. J.

May 1—Non-Ferrous Founders' Society, annual meeting, Atlantic City, N. J.

May 6-9—International Lighting Exposition and Conference, Public Auditorium, Cleveland

May 14-16—Society for Experimental Stress Analysis, spring meeting, Lincoln Hotel, Indianapolis

May 16—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 22-24—American Society for Quality Control, annual convention and exhibition, Onondaga County War Memorial Auditorium, Syracuse, N. Y.

May 23—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 16-17—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 23-27—American Society for Testing Materials, annual meeting, Statler Hotel, and Hotel New Yorker, New York

July 25—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Sept. 8-10—American Standards Association, national standardization conference, Museum of Science & Industry, Chicago

Sept. 8-12—Instrument Society of America, annual meeting, Cleveland

Sept. 22-23—Steel Founders' Society, fall meeting, the Homestead, Hot Springs, Va.

Sept. 26-27—Ohio Regional Foundry Conference, Ohio Chapters, AFS, and Ohio State Student Chapter, Ohio State University, Columbus, O.

Oct. 16-17—Gray Iron Founders' Society, annual meeting, Hotel Cleveland, Cleveland

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—Michigan Regional Conference, Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, AFS, University of Michigan, Ann Arbor, Mich.

Oct. 20-24—American Society for Metals, National Metal Congress and Exposition, Philadelphia

Oct. 25-26—Northwest Regional Foundry Conference, Oregon, Washington, and British Columbia Chapters, AFS, Multnomah Hotel, Portland, Oreg.

Nov. 10-12 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 13-14—Southwestern Regional Foundry Conference, Texas and Tri State Chapters, AFS, Baker Hotel, Dallas, Tex.

Nov. 19—American Standards Association, annual meeting, Waldorf-Astoria Hotel, New York

Dec. 4-6—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference William Penn Hotel, Pitttsburgh

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(Concluded from page 125)

the Brass and Bronze and Sand divisions will be a symposium on shell molding. A second shop course will cover synthetic and naturally bonded sands. Technical session subjects include gating practices, fracture characteristics, aluminum bronzes in high-pressure castings, and effect of lead and nickel on grain size.

Patternmaking: At two technical sessions and a roundtable luncheon the Pattern Division will discuss coreboxes, patternmaking to compensate for shrink allowance, apprentice training programs, wood pattern construction and new developments in metal patternmaking.

Malleable: A joint session with the Refractories Committee will consider refractories for malleable duplexing and batch type air furnaces. Other sessions will have such subjects as tests for hot tears, melting furnace atmosphere effect on fluidity and hot tears, effect of phosphorus on graphitization of blackheart malleable, and use of boron additions to cut annealing time. At a Monday roundtable luncheon dielectric core baking and fluidity testing will be discussed.

Steel: Subjects of papers at Steel Division sessions include boron substitution for alloys in cast steel, application of chills, metallurgy and mechanics of hot tearing, steel desulphurization with injected carbide, cutting with high-purity oxygen, and statistical quality control.

Sand: In addition to the sand course to be held in conjunction with the Brass and Bronze Division, the Sand Division will conduct two other courses—"Use of High-density Molding Materials" and "Household Hints and Tips." Four technical sessions will have papers on olivine as a molding material, bonding of sands, influence of oven atmosphere on mold drying and core baking, flowability of foundry sands, mineral pearlite, and riddle size influence on molding sand tests.

Education: The International Education Dinner referred to previously will be supplemented by two sessions on chapter educational activities. Another Education Division session will treat apprentice training and management's responsibility in training programs.

Working Conditions: An expanded program covering this general subject will be conducted by the Safety and Hygiene and Air Pollution group. Three sessions are scheduled, one primarily for nonferrous foundrymen. Other sessions will cover various subjects related to ventilation, dust collection, air pollution and health problems.

General Interest: Refractories Committee will meet with the Gray Iron Division to discuss cupola refractories, in addition to its joint session with the Malleable Division. Time Study and Methods Committee will have two sessions to consider waste control, standards for rough chipping, melt department incentives, and use of motion pictures in time study work. Plant and Plant Equipment Committee will devote two sessions to molding machines. Two sessions also are scheduled by the Foundry Costs Committee, one a question-and-answer panel and the other on pricing castings using standard costs.

At the Heat Transfer Committee's two sessions the subjects will be heat flow in moist sand, solidification of nodular iron in sand molds, riser treatments and relationship of space, time and temperature in casting metals.

Plant Inspection: Although Atlantic City itself is devoid of foundries, the popular plant inspection program is retained this year through the availability for visits of foundries in the nearby Philadelphia area. For details see page 136 this issue.

NON-FERROUS FOUNDERS' SOCIETY

To Meet at Atlantic City

NON-FERROUS Founders' Society will hold its annual membership business meeting at the Traymore Hotel, Atlantic City, Thursday morning, May 1. Reports of officers and committees will be presented and discussed. New programs, especially those dealing with Washington activities, will be presented for membership reaction and adoption.

The annual "Let's Get Acquainted" dinner meeting of the society will be held Thursday evening at the Traymore Hotel. Society president J. D. Zaiser, Ampco Metals Inc., Milwaukee, will act as toastmaster for the evening which will feature an outstanding speaker and entertainment. Elected officers for the year 1952-53 will be presented. Dinner at 7 p.m. will be preceded by a cocktail hour, for members, their ladies and guests.

Final meeting of the 1951-52 board of directors of the Nonferrous Founders' Society will be held in the Claridge Hotel, Atlantic City, on Wednesday, Apr. 30. Policies for future activities will be discussed for presentation to the annual membership meeting the following morning.

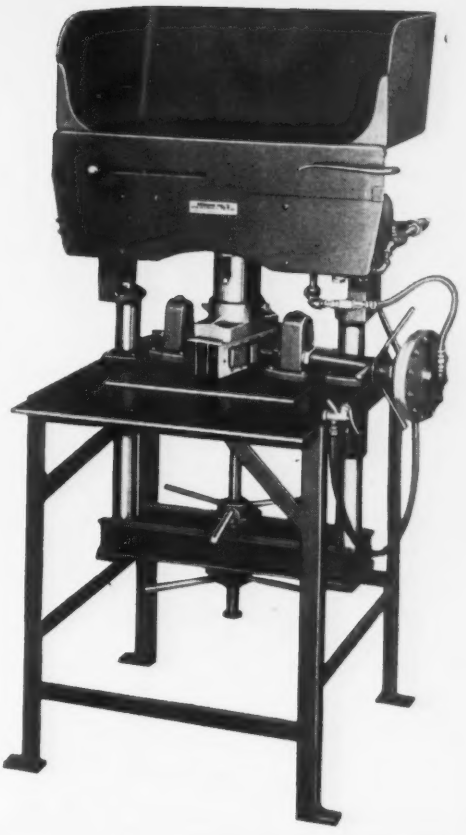
The society will maintain a booth during the International Foundry Show of the American Foundrymen's Society for service to the industry. An outstanding feature will be the attendance during May 1, 2 and 3 of officials from the foundry branch of the Copper Division and the Aluminum and Magnesium Division of NPA to answer any questions or inquiries concerning the use of these metals. All foundrymen are invited to make use of this service and to use the booth.

J. D. ZAISER
President

J. W. WOLFE
Secretary-Treasurer

Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



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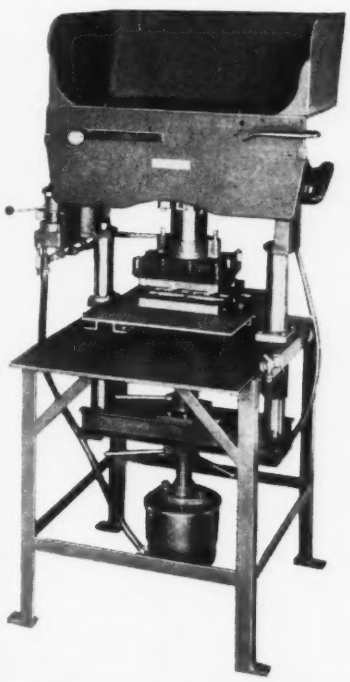

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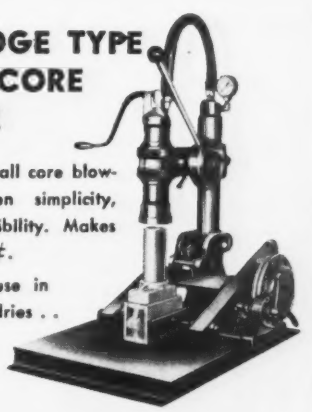
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

Write for Specification Bulletin "D"

THE CARTRIDGE TYPE BENCH CORE BLOWER



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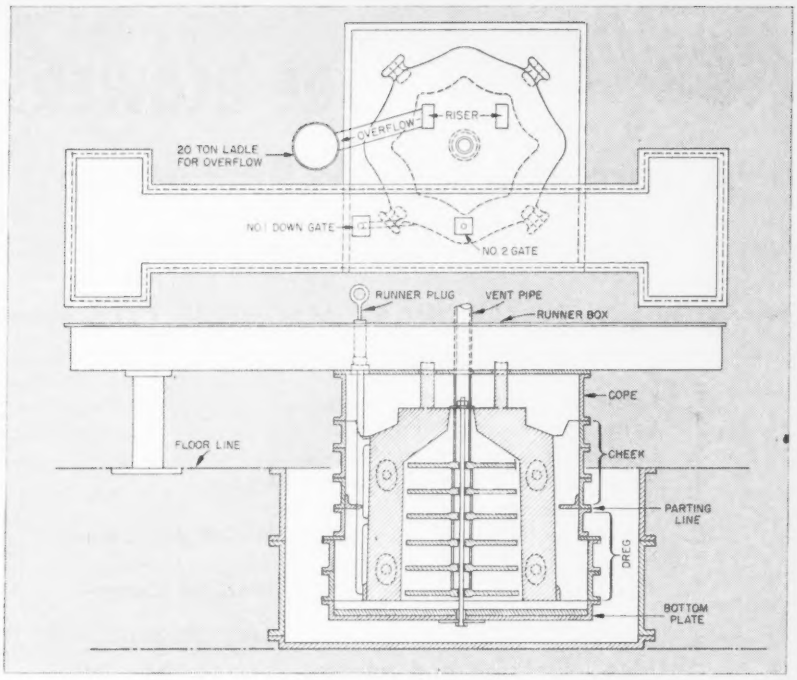
CASTING MOLDS

for Steel Ingots

By PAT DWYER
Engineering Editor
FOUNDRY



Layout of mold rigging, runner basin, sprues, risers and flowoff ladle employed in pouring a large gray iron ingot mold casting at plant of Dominion Steel & Coal Corp. Inc., Sydney, Nova Scotia

THE Dominion Steel & Coal Corp. Inc. operates a number of manufacturing plants, ore mines, coal mines and quarries in various parts of Canada. At the Sydney, N. S., plant steel is melted in open-hearth and electric furnaces and converted into ingots for rolling or forging. Majority of the ingots go through the adjoining blooming billet, rail and rod mills. The forging ingots, ranging from 15 to 65 tons, are shipped to the Trenton, N. S., plant where they are reduced to the desired shape in huge hydraulic presses.

In normal operation the forging ingots are cold by the time they arrive at Trenton after a train journey of nearly 200 miles and a car ferry crossing at the Strait of Canso. Before the ingots can be processed they are brought up to proper temperature in soaking pits.

Steel men for many years have wrestled with the problem of bridging this gap in the production line, seeking a means that would carry the ingots at high temperature from the melting shop to the blooming mill or forge. Present practice of Dominion Steel offers one solution to this problem.

The ingot, shortly after solidifying, is lifted vertically from a big-end-up ingot mold, tilted to a horizontal position and lowered into a specially insulated steel box anchored to a flat car. It is held in place by premolded supports while the remainder of the space is filled with tamped vermiculite supplied by the Zonolite Co., Chicago. Temperature of the ingot when it leaves the open-hearth department in its insulated steel box is 1600° F; its temperature on arrival at the Trenton forge is between 1550 and 1600° F. The time saved between shipping the ingot cold and shipping it hot is approximately 30 days.

From a foundry standpoint probably the most important feature is the casting practice involved in producing the large iron ingot molds in the gray iron, steel and nonferrous foundry located near the south end of the company's plant in Sydney. Up to the present the largest mold made in this foundry weighs 85 tons. Method of making the mold for a 77-ton ingot mold is indicated in the accompanying illustration. Usual ratio of weight of ingot mold to ingot is 1.2—1; for example, a 60-ton ingot requires a 72-ton mold.

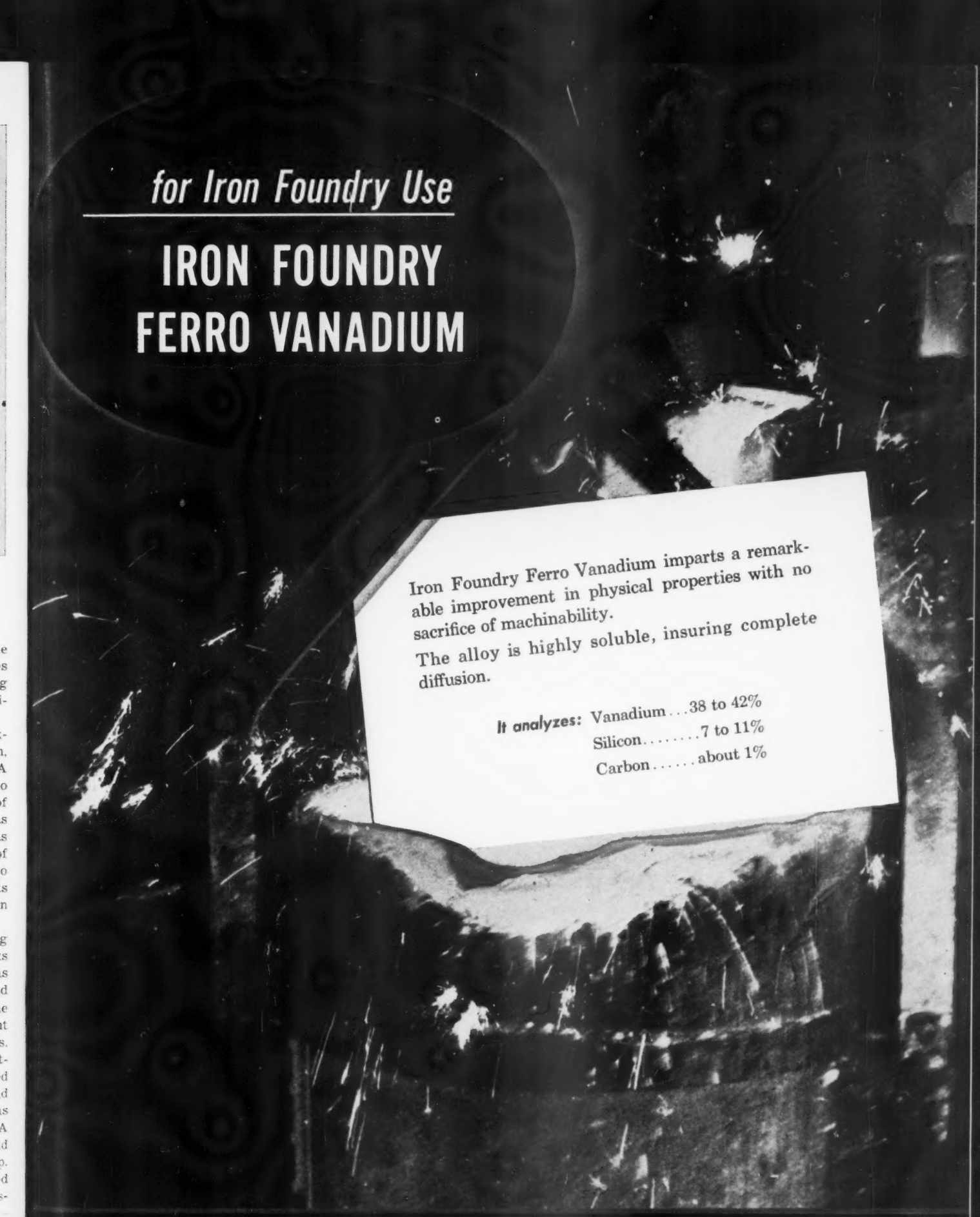
About 100 tons of iron was melted to pour a 65-ton ingot mold. The mixture of 70 per cent pig iron and 30 per cent ingot mold scrap showed an average analysis of 1.50 Si, 0.07 S, 0.07 P, 0.95 Mn. Average analysis of the pig iron is 1.75 Si, 0.04 S, 0.04 P, 1.20 Mn. Metal in the cupola in the bed, between charges and in the spout is fluxed with soda ash. The iron is melted in two 60-in. ID cupolas, and poured into the mold from one 30-ton, two 20-ton and four 10-ton ladles. The foundry is equipped with one 25-ton electric traveling crane and one 20-ton crane; actually the first crane has a lifting capacity of 40 tons, and the second crane can lift 30 tons. All ladles are filled from a 20-ton ladle under the cupola spout. The iron in the ladles is kept hot with a generous covering of charcoal and blacking for approximately 4½ hours.

Twelve days after the patternmakers started working on the pattern, the mold was ready for the iron. A complete pattern was employed to form both the outside and inside of the mold. The inside, or core, was erected directly on the drag and was not disturbed. The outside part of the mold included a cheek in two parts and a cope. The various parts were dried for three days and then assembled in the casting pit.

With the exception of the lifting plates to carry the sand in the cheeks and a rectangular plate to serve as a connection between the middle and top sections of the cheek, all the flasks and other pieces of equipment were selected from existing facilities.

The pattern was centered and erected on a sand bed rammed and finished flush with the drag joint line. Sand on the outside of the pattern was rammed in the usual manner. A parting was made half way up and a third parting made at the top. A 3-in.-diam sprue was incorporated in one corner of the mold for distributing metal through three gates—one at the bottom, one near the center and one near the top of the mold. A second sprue was formed directly on top of the mold cavity and in line with the first gate so that both sprues might be served from the same pour-

(*Concluded on page* 194)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Iron Foundry Ferro Vanadium imparts a remarkable improvement in physical properties with no sacrifice of machinability.
The alloy is highly soluble, insuring complete diffusion.
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MAKERS OF ALLOYS
VANCORAM
CHEMICALS AND METALS

(*Concluded from page* 192)
ing basin.

The core, built directly inside the pattern, was supported by crabs or arbors spaced about 12 in. apart, and with studs between each pair. A long bolt extended from below the drag to a point about 6 in. above the top of the pattern. It was enclosed near the top in a perforated 8-in.-diam pipe which, in turn, rested on the top arbor. A washer was placed over the upper end of the pipe and the bolt was drawn up tight. Two short pieces of light rails were placed under the washer and over the pattern to hold the pattern and core in place while the crane was lifting the cheeks from outside the pattern.

A long runner basin was lined with sand and dried. Two holes were left in the bottom to correspond to the two sprue openings in the cope. With the runner basin in position, a square block core with a 3-in.-diam hole in the center was adjusted in place over each sprue. Sand was packed around the block and the surface in the vicinity was slicked to correspond to the remainder of the basin bottom.

To facilitate pouring the metal with two cranes the mold was set up in the casting pit with the long runner basin in line with the columns supporting the crane runway. In this manner, with the crane trucks touching, the ends of the runner basin were approximately 22 ft apart. The runner basin, with a capacity of 20 tons, served as a reservoir and elastic link in the cycle of operation incidental to handling six ladles with two cranes.

The 30-ton ladle was hoisted to the north end of the runner basin, the end farthest from the cupolas. One 20-ton ladle was hoisted in a similar manner at the south end and the entire content poured into the runner basin. This ladle then was placed on the floor and the second filled 20-ton ladle was picked up and spotted by the crane. While making the transfer the plug was pulled from the top of No. 1 sprue and pouring was commenced from the large ladle to keep the runner basin filled and to prevent any slag or other foreign material from entering the mold.

With the mold about three-quarters filled, the plug was pulled from No. 2 sprue and the remaining ladles were picked up in turn and emptied into the runner basin. One empty 20-ton ladle was placed alongside the mold to catch the overflow from the top of the riser. This also served to drain all the iron out of the runner basin. The metal caught in this manner was poured into a mold for one of the standard 8-ton ingot molds and several other castings on the floor. With the exception of the sprues and gates there was no scrap or return metal in connection with the production of the large ingot mold casting.

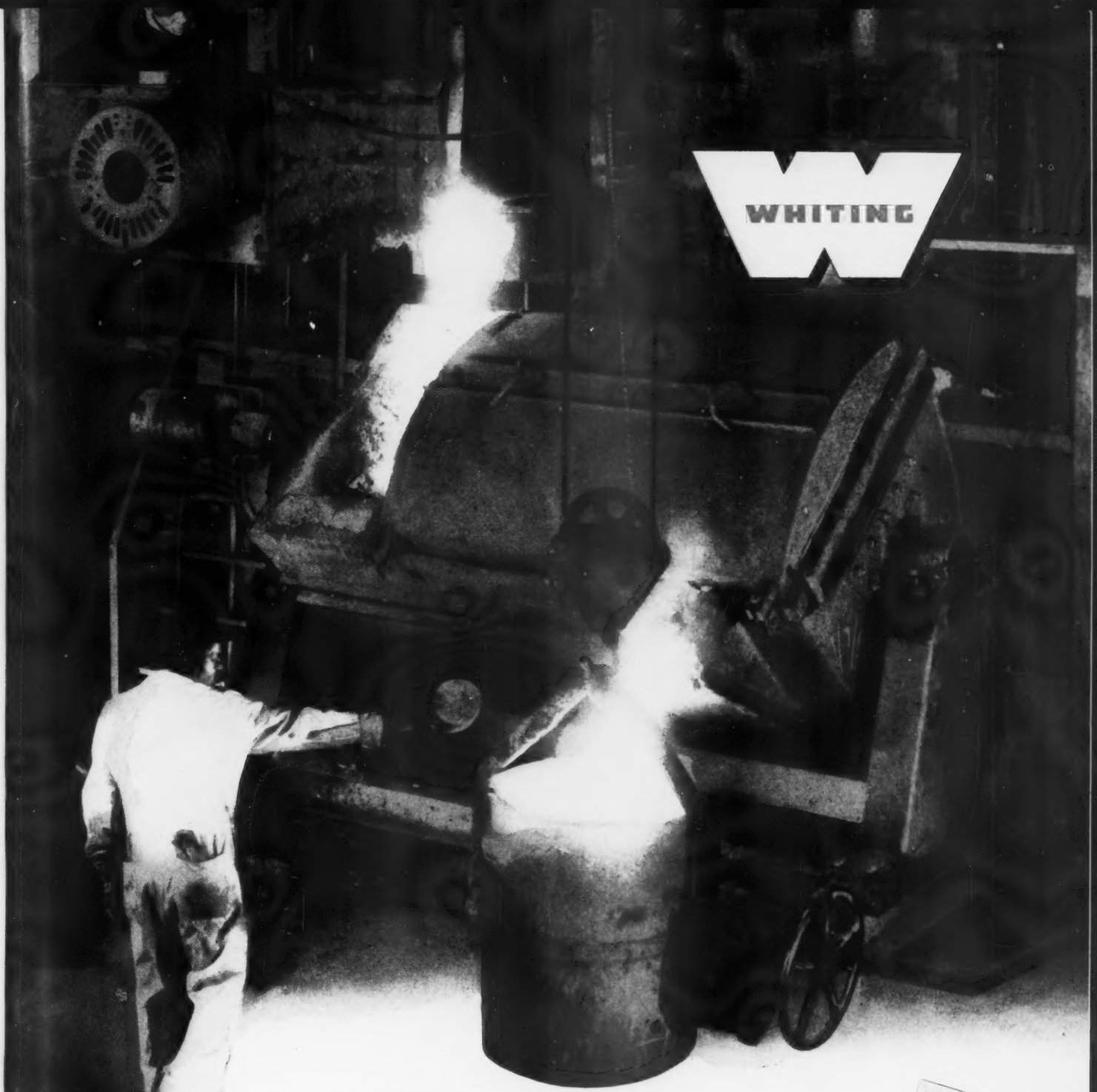
In the last 25 years many large ingot molds have been made in the foregoing manner. The work is carefully planned and strictly supervised. Cranes, cables and hoisting gear are examined. Cupolas and blowers are inspected. Expert molders handle the ladles, and shop millwright and electrician take stations on top of each crane during the pouring period.

New Jersey Sand Producing Plants Open to Visitors

(*Concluded from page* 137)
Chartered buses will leave Atlantic City the mornings of Friday, May 2 and Tuesday, May 6 for the Philadelphia area plant tours. Certain foundries also will be open to visitors on other days of the week.

Information concerning plant inspections will be available at a headquarters desk to be maintained by the Philadelphia Chapter Plant Visitation Committee at Convention Hall. Arnold N. Kraft, Wilkening Mfg. Co., Philadelphia, is chairman of the committee. Arrangements also may be made at the headquarters for visits to New Jersey sand plants. The various sand companies listed in the schedule below will provide transportation for visitors desiring to inspect their plants. Dan Jones, New Jersey Silica Sand Co., Millville, N. J., is chairman of the sand producers' group.

Plant	Products
DANIEL GOFF CO. INC. **Clayville, N. J.**	**Naturally bonded foundry sand and clay deposits. Screens and loading apparatus for all bonded sands.**
MILLVILLE SILICA SAND & GRAVEL CO. INC. **Port Elizabeth, N. J.**	**Silica sand deposits and wash plant, screens and dryers for production of wet and dry grades, special blends, core sands, furnace bottom, and sandblast sands.**
JESSE S. MORIE & SON INC. **Mauricetown, N. J.**	**Equipment for producing unbonded foundry and industrial sands. Dredges, washers and dryers.**
NATIONAL PULVERIZING CO. **Millville, N. J.**	**Three large grinding mills for production of silica flour from 90-325 mesh. Vibrating screens for sandblast graduation. Two modern dryers preparing sand for the foundry industry.**
NEW JERSEY SILICA SAND CO. **Millville, N. J.**	**Deposits of silica sand, naturally bonded sands and clay. Dredges, wash plants and screening plants with classifying equipment for grading silica sands of all finenesses. Natural bonded sand produced by mills, mullers, and screens. Kiln drying equipment. Modern office and laboratory.**
GEORGE F. PETTINOS, INC. **Williamston Junction, N. J.** **Manumuskin, N. J.**	**Silica sand deposits, screening, washing, and drying plant for high grade sands. Silica sand deposits, screening, washing, and drying plant for graded silica sands and sandblast sands.**
TAGGART BRIMFIELD CO. **Hammonton, N. J.**	**Pits and screens for the production of gravels, molding sands, and clay sands for general foundry work.**
TRI STATE SAND CO. **Millville, N. J.**	**Equipment for the production of naturally bonded sands. Rotary screens and conveyors. Naturally bonded sand deposits.**
WHITEHEAD BROTHERS CO. **Dividing Creek, N. J.**	**Silica sand deposits, wash plant, screening and drying operations for silica sands of all finenesses.**
WHITEHEAD BROTHERS CO. **Dorchester, N. J.**	**Naturally bonded sand deposits. Screening plants for the production of naturally bonded gravels, molding sands, and clays.**



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This new Whiting paper will give you valuable information on one of today's most important subjects. It tells you where to watch for heat losses all the way from melting furnaces to molds—*and what to do about them!* The bulletin is well illustrated and contains charts and diagrams that will interest every foundryman. Ask your Whiting salesman for Bulletin FO-5 or write to:

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FO-2, "Tips On Improving Cupola Charging"
FO-3, "Hot-Blast"; FO-4, "Facts On Duplexing"

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Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	920,502	512,192	.....
1951			
Jan.	92,508	54,817	234,060
Feb.	88,950	54,915	255,347
Mar.	101,667	60,265	267,169
Apr.	97,276	57,554	276,463
May	100,800	61,373	274,954
June	94,376	57,176	258,144
July	76,826	45,072	263,017
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,083,545	654,380	.....
1952			
Jan.	87,003	54,988	202,799

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Shipments—Die	Unfilled Orders[3]
1949	304,409	106,825	102,908	87,812	.....
1950					
Dec.	46,005	15,681	15,052	14,322	104,380
Total	452,643	154,046	143,821	144,661	.....
1951					
Jan.	42,538	14,401	14,554	12,641	93,264
Feb.	40,785	14,106	13,082	12,852	94,581
Mar.	42,204	15,900	12,771	12,677	100,453
Apr.	40,242	14,455	12,901	12,079	106,077
May	40,487	14,798	13,400	11,692	112,638
June	35,961	13,853	10,323	10,850	112,760
July	27,426	10,739	7,142	8,693	119,461
Aug.	35,531	14,128	10,922	9,526	117,888
Sept.	32,487	13,086	8,829	9,730	122,973
Oct.	35,222	13,950	10,131	10,297	110,382
Nov.	32,367	12,728	8,816	9,926	116,044
Dec.	30,799	12,587	8,387	8,441	112,479
Total	436,049	164,731	131,258	129,404	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled Orders[2]
1949	724,053	654,444	37,311	.....
1950				
Dec.	100,641	90,606	5,985	68,738
Total	1,022,291	925,495	52,756	.....
1951				
Jan.	102,643	92,171	6,363	77,580
Feb.	96,946	87,667	5,427	75,967
Mar.	110,887	100,221	6,405	79,766
Apr.	101,506	91,852	5,802	82,711
May	105,438	95,049	5,986	84,002
June	98,559	88,818	5,358	83,518
July	76,551	69,334	4,064	85,837
Aug.	94,443	84,720	5,097	84,821
Sept.	85,433	76,304	5,161	84,611
Oct.	94,706	84,544	5,845	82,491
Nov.	87,764	78,640	5,661	82,667
Dec.	76,526	69,653	4,639	80,435
Total	1,131,402	1,018,973	65,808	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[3]
1949	9,364	8,781	....
1950			
Dec.	1,528	1,444	6,958
Total	12,314	11,582	....
1951			
Jan.	1,840	1,739	8,616
Feb.	1,907	1,801	10,878
Mar.	2,156	2,058	12,196
Apr.	2,267	2,161	12,191
May	2,334	2,206	12,867
June	1,758	1,642	14,331
July	1,676	1,557	15,528
Aug.	2,270	2,135	16,095
Sept.	2,010	1,931	16,407
Oct.	2,371	2,300	16,143
Nov.	2,774	2,461	15,550
Dec.	2,220	2,098	14,729
Total	25,583	24,089	.....

Foundry Production Workers

Estimated Number

	Jan. 1952	Dec. 1951	Jan. 1951
Gray Iron	.....	153,400	161,000
Malleable	.....	27,500	26,800
Steel	.....	66,800	55,200
Nonferrous	.....	91,900	94,500

Average Weekly Earnings

Gray Iron	$70.30	$69.84	$70.63
Malleable Iron	70.78	72.85	71.52
Steel	76.66	78.75	73.19
Nonferrous	78.06	78.24	72.33

Average Weekly Hours

Gray Iron	41.4	41.3	43.6
Malleable Iron	40.0	41.3	42.7
Steel	42.9	43.7	42.8
Nonferrous	42.4	42.8	42.1

Labor Turnover Rate (Dec.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	2.5	3.8	1.8	1.3
Malleable Iron	2.3	4.0	1.8	1.3
Steel	3.7	3.3	2.4	0.2
Nonferrous	4.1	2.2	1.2	0.4

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

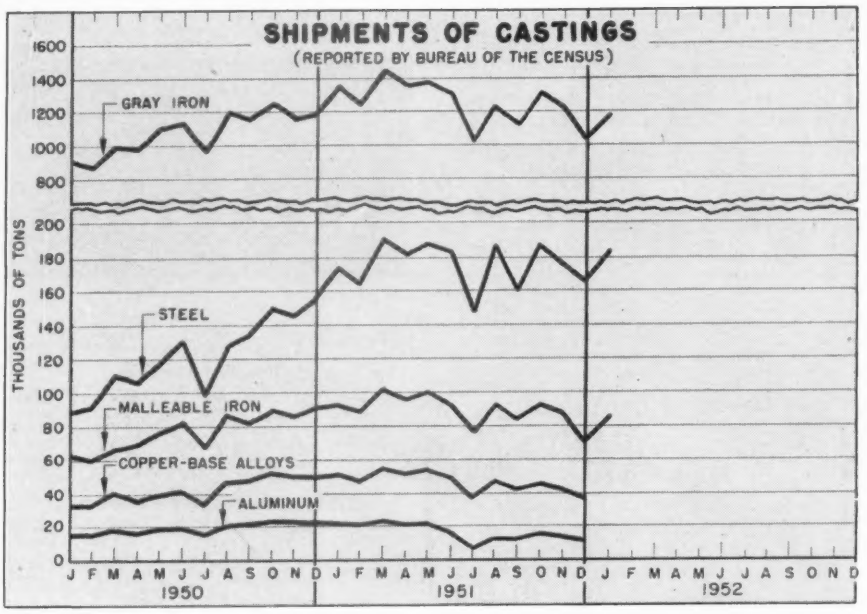
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Chilled Railroad Car Wheels—For Sale	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[2]	Unfilled Orders[3] Total
1950	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
Jan.	1,364,311	762,407	875,437	405,863	228,824	103,475	56,046	49,065	131,779	72,225	2,297,705
Feb.	1,234,226	684,928	811,724	369,932	193,648	91,598	49,423	43,967	117,141	62,290	2,391,843
Mar.	1,440,149	818,473	920,802	427,162	231,853	114,858	62,282	57,241	144,620	74,592	2,389,659
Apr.	1,363,041	766,735	880,381	403,619	217,970	106,417	61,993	54,002	134,302	68,395	2,336,926
May	1,396,236	796,053	897,913	418,950	225,129	112,145	65,721	57,485	139,854	67,619	2,228,596
June	1,308,987	742,794	847,024	395,329	216,620	108,042	58,620	52,700	121,851	64,872	2,162,152
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,987,696	8,449,515	9,571,570	4,469,069	2,624,517	1,257,542	633,996	563,272	1,474,110	699,000	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,263	57,155	53,551	125,729	45,149	1,800,905

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
Jan.	174,056	124,002	42,805	135,086	98,197	37,790	38,970	25,805	5,015	675,385
Feb.	163,976	117,156	42,565	126,293	93,461	36,793	37,683	23,695	5,772	706,989
Mar.	190,665	134,184	44,196	148,884	107,745	39,492	41,781	26,439	4,744	779,717
Apr.	181,908	129,059	41,545	139,948	102,367	37,553	41,960	26,692	3,992	846,947
May	189,232	131,102	39,845	143,201	101,363	35,511	46,031	29,739	4,334	881,702
June	184,424	131,219	42,337	141,538	103,090	38,200	42,886	28,129	4,137	895,054
July	147,251	100,141	27,585	111,964	78,034	24,516	35,287	22,107	3,069	929,978
Aug.	177,096	128,981	41,763	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Sept.	160,695	116,658	35,500	120,632	89,771	33,086	40,063	26,887	2,414	918,038
Oct.	189,929	139,953	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,034	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,298	29,341	45,348	34,150	3,872	846,436
Total	2,100,970	1,507,179	476,372	1,583,375	1,162,687	415,955	527,695	344,492	50,457	.....
1952										
Jan.	183,738	139,488	37,091	133,985	102,265	31,806	49,753	37,223	5,285	869,299

[1] Source: Bureau of the Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	....
Apr.	490.1	....
May	431.7	....
June	393.2	....
July	390.3	....
Aug.	404.5	....
Sept.	346.5	....
Oct.	372.4	....
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	24,211
Mar.	31,997	.....
Apr.	30,472	.....
May	33,267	.....
June	33,817	.....
July	32,016	.....
Aug.	25,285	.....
Sept.	22,285	.....
Oct.	23,124	.....
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1949	377,779	248,679	.....
1950			
Dec.	47,818	31,161	102,636
Total	536,398	341,833	.....
1951			
July	34,064	23,088	85,028
Aug.	37,321	22,985	80,588
Sept.	31,507	20,021	81,539
Oct.	36,565	22,608	76,589
Nov.	30,531	19,219	81,955
Dec.	26,998	17,028	77,308
Total	450,375	291,796	.....

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,523,396
1951			
Jan.	6,811,309	6,786,198	333,191
Feb.	6,008,154	6,045,800	293,169
Mar.	6,683,119	6,697,525	299,267
Apr.	6,471,316	6,335,793	357,018
May	6,730,122	6,716,780	367,946
June	6,567,640	6,638,043	324,758
July	6,629,863	6,495,585	301,447
Aug.	6,768,161	6,674,495	299,027
Sept.	6,470,658	6,366,969	274,017
Oct.	6,742,767	6,727,211	292,737
Nov.	6,501,098	6,562,279	272,338
Dec.	6,738,759	6,821,446	249,490
Total	79,122,966	78,868,124	3,664,404
1952			
Jan.	6,802,272	6,757,690	260,257

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap		By Types of Furnace					
			Cupola		Air		Electric	
	Total	Purchased	Total	Purchased	Total	Purchased	Total	Purchased
1949	49,281,000	22,922,000	7,968,000	4,175,000	801,000	276,000	4,239,000	2,608,000
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Jan.	5,975,382	3,010,300	1,009,142	533,705	110,004	41,116	684,484	435,633
Feb.	5,337,562	2,691,692	936,918	492,395	101,233	38,135	627,308	398,814
Mar.	6,187,520	3,100,622	1,064,325	558,833	108,513	39,260	728,786	463,371
Apr.	5,987,947	3,013,527	1,029,069	545,897	103,458	37,973	704,416	457,521
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,644	2,581,856	747,864	393,254	80,903	29,858	632,782	421,689
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,446
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Jan.	5,837,011	2,788,426	.....	.....	.....	.....	.....	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons)					Consumption* (By type of furnace, 1000 gross tons)			
	Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Jan.	5,801.7	300.0	233.3	4,529.8	738.6	5,367	542	32	11
Feb.	5,084.8	238.7	226.0	4,007.2	612.9	4,725	492	29	10
2 mo.	10,886.5	538.7	459.3	8,537.0	1,351.5	10,092	1,034	61	21
Mar.	5,919.3	267.9	276.5	4,647.5	727.5	5,406	550	33	15
Apr.	5,812.2	259.1	261.0	4,575.8	716.1	5,281	516	31	11
May	6,104.9	282.0	259.4	4,777.0	786.5	5,522	533	31	11
June	5,911.3	254.2	276.5	4,631.9	748.7	5,348	486	30	11
July	5,994.8	280.4	250.0	4,702.8	761.6	5,317	378	23	10
Aug.	5,988.6	252.7	254.4	4,723.3	758.2	5,358	465	30	11
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	5,452	...	...	...
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	....	...	...	...
2 mo.	11,666.1	478.3	547.2	9,169.2	1,471.4	....	...	...	...

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

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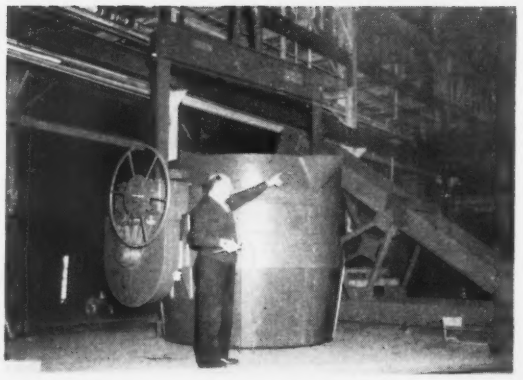
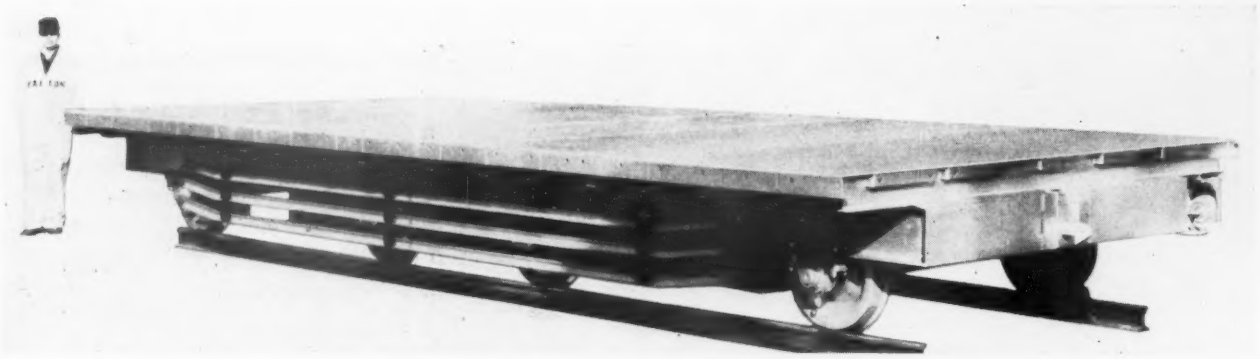
NEWS VIEWS



→ **TO SWITZERLAND:** Modern Equipment Co., Port Washington, Wis., recently shipped this 22,000-lb ladle to Sulzer Bros., Winterthur, Switzerland. It is 79 in. in diameter at the top and is equipped with both a top lip and bottom pour mechanism. The ladle will be used in pouring iron and steel castings.

← **UNIVERSITY FOUNDRY:** One of the exhibits at the recent Foundry Educational Foundation conference in Cleveland was this scale model of the University of Michigan's foundry. Around the table, left to right, are: Charles W. Briggs, Steel Founders' Society of America; Richard A. Flinn, University of Michigan; Fred J. Walls, International Nickel Co., Detroit; Claude B. Schneible, Claud B. Schneible Co., Detroit; Robert Hardy, Central Specialty Division of King Seeley Corp., Ypsilanti, Mich.; Larry P. DeBoer, University of Michigan; G. A. Conger, University of Michigan; Frank F. Riecks, Ford Motor Co., Detroit.



↑ **CASTING CAR:** Tank armor steel castings ride 24 cars like this one in the new heat treating plant of General Steel Castings Corp., Eddystone, Pa. The cars, built by the Easton Car & Construction Co., Easton, Pa., are electric-motor driven, and sequence of their movement to the furnaces and timing of their passage through heating zones are automatically governed from centralized control stations. The 24 cars, each 26 ft 9 in. by 11 ft 8 in., have a capacity of 75,000 lb. They will have an 8-in. refractory deck and side and end sand seals.

← **TRUCKSTRIP:** American Cyanamid Co. discovered that steel mats can provide firm footing for fork trucks, in addition to their wartime use in making emergency airstrips for planes. Pending the laying of a concrete floor at the company's Willow Island, W. Va., plant, the matting served satisfactorily as an inexpensive temporary flooring. (Baker-Raulang Co. photo)

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AROUND THE COUNTRY

News Reports from . . .

GRAY iron foundries are receiving more inquiries than they have had for many months, but how much of this business will actually materialize is anybody's guess. Automotive demand for castings is somewhat improved, and second quarter got under way with production higher than even the more optimistic souls had hoped for. Some automotive die work has been awarded local foundries and several automakers are pushing their new V-8 engine programs in the hopes that tooling for the new designs can be completed in time for inclusion in 1953 models.

One of these is Ford, whose Cleveland engine plant will turn out an overhead-valve V-8 for the 1953 Mercury, according to present schedules. Approximately 50 per cent of the machinery required for the Mercury engine line has been delivered, and installation of scattered pieces of equipment has begun.

The Ford six-cylinder engine production line in that plant represents a new high in automaticity. For example, the entire cylinder block machining department, which begins work on the rough casting and turns out a finished block ready for assembly, consists of one "tool". Actually a series of 42 individual transfer-type machine tools connected by shuttle-type automatic transfer conveyors, the block line covers more than an acre of space in the million-sq-ft plant, and if stretched out would measure 1545 ft long. Cylinder head machining is carried on with similar machinery, a rough casting entering the line and emerging a finished head ready for assembly.

Going beyond the push-button stage of automaticity, these two lines are directed by 40 interrelated electric nerve-centers which control the conveyors as well as the machine tools.

Shell molded nodular iron crankshafts and camshafts are used in the engines as well as shell molded valves.

In pilot plant operation for some time, Ford's Cleveland foundry, containing 1.2 million square feet of floor space and featuring numerous innovations in foundry equipment and operating procedures, was scheduled to start pouring iron in April. First molding line was to be for six-cylinder engine blocks, with molding lines for cylinder heads and component parts expected to be ready for production in May. However, peak production is not looked for until this fall.

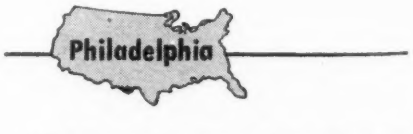
AIRCRAFT Engine Division, Ford Motor Co., Chicago, met its initial production schedule on Mar. 21 when it shipped the first engine to Carswell Air Force Base in Texas. This marked completion of 18-months' preparation to build Pratt & Whitney Wasp Major engines, and it was considered a notable achievement, considering that machinery shortages had harrassed the tooling up program almost from the start.

There is little question but that other conditions of the contract will be fulfilled. It will be recalled that Air Materiel Command recently sliced down the original contract for reciprocating engines and awarded Ford a $30 million order for Pratt & Whitney J-57 jet engines. By start of 1953, production is expected to be jets exclusively.

The huge plant, including the magnesium foundry, is being retooled for the jet job. In addition to producing magnesium castings for the plant's own needs, the foundry is making aircraft castings for several outside companies, including Wright Aeronautical, Studebaker, Packard, Nash-Kelvinator and Buick.

Safety is being stressed heavily in the foundry, and workers are so thoroughly imbued with the program that they are coming forward with many useful suggestions. One employee, a shakeout operator, devised a leather forearm protector which keeps his arm free from sparks, and the idea has been adopted by many other foundrymen. Another worker came up with a small gadget that makes the handling of castings much easier. The device steadies the casting so that it does not tip when being moved by a chain hoist.

The majority of men and women in the foundry are wearing safety shoes as result of the safety program. Last fall a Foundry Plant safety shoe store was opened and it has enjoyed good business. New purchasers of shoes become members of the Toe Savers Club. Store operates under the slogan "With everything to gain and toes to lose, it's wise to wear your safety shoes." Opening of the store was marked with a demonstration of driving a 6000-pound jeep over the toes of safety shoes to demonstrate their protective ability.



GRAY iron business shows further slight improvement, ascribed in part to a shrinkage in consumer inventories. Foundries are averaging four to five days a week, and indications point to a still further gain in business over the remainder of this half, although hardly comparable with the volume of a year ago.

Contributing to the outlook for a further gain are easing of government

(*Concluded on page* 204)

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Bulletin 105 will bring you all the facts about Carrier Natural-Frequency Conveyors, including vertical vibrating spiral elevators. *Mail the coupon today!* Carrier Conveyor Corporation (formerly Whitley-Carrier Co.), Frankfort Avenue at Clifton, Louisville 6, Kentucky.

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(*Concluded from page 202*)

limitations on consumer hard goods production and the likelihood of heavier demands for pipe including both pressure and soil pipe, as the more active building season gets under swing.

At present most shops are current on deliveries, orders having not taken a sufficient spurt to create any appreciable backlogs. Direct defense work remains light, probably averaging no more than 5 or 7 per cent. Including defense-support work, however, the percentage is somewhat higher, particularly if machine tool requirements are taken into consideration.

Steel foundries continue highly active, operating at least five days a week and in some cases six days. Backlogs run around 16 to 18 weeks. Requirements for defense and for the tooling for defense contribute heavily to present business.

To meet increasing requirements for cast armor plate for tanks, the Army is having plans prepared for a $25,000,000 project at Birdsboro, Pa. This plant will be operated by the Birdsboro Foundry & Machine Co. Valley Forge Associates, this city, comprising four large engineering and contracting firms, are in on the development of plans and contracts. Construction is expected to be well under way by the latter part of this year. Approximately 5000 to 6000 tons of structural steel will be required, incidentally.

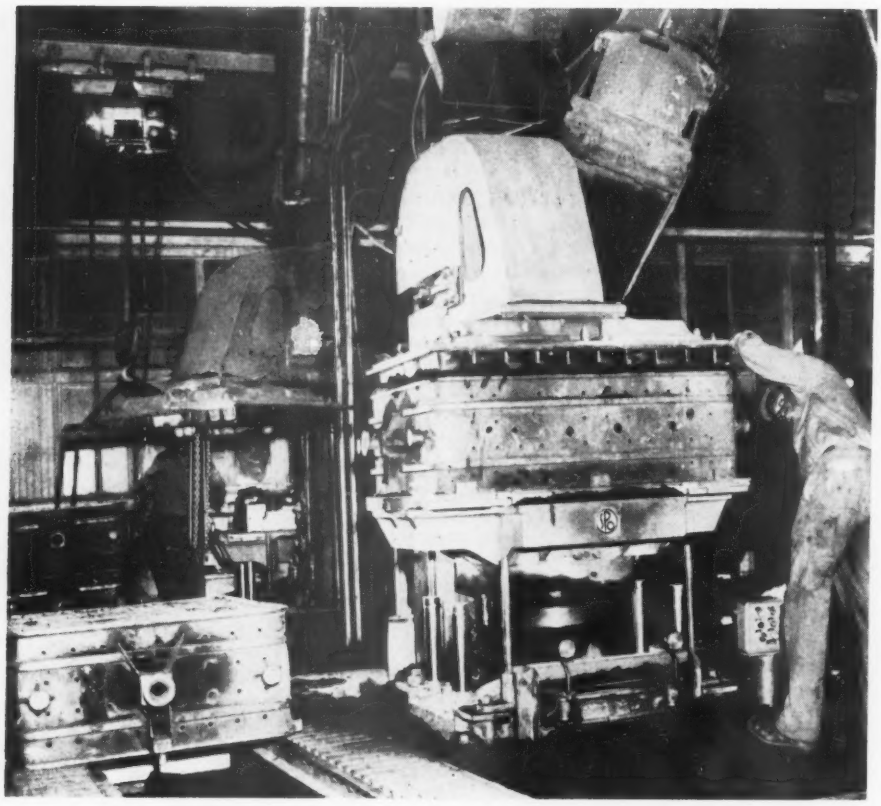
Malleable casting production is maintaining a steady pace, with most shops operating five days a week. Sustaining output at this time is an improvement in agricultural equipment requirements and in pipe fitting needs, the latter reflecting a betterment in building construction and repairs.

The large nonferrous shops are relatively busy. They usually have the control equipment needed to handle the special specifications of much of the defense and defense support requirements, the bulk of their production. One large bronze shop estimates that 25 per cent if its production is going into direct defense and another 50 per cent into steel mill and public utility equipment, all of which latter is regarded as essential to the defense effort.

The proportion of emergency work of the aluminum foundries is even heavier. Certainly that is true with regard to direct defense needs, those of the aircraft industry in particular. However, there has been some leveling off. The small nonferrous shops, relying largely on civilian business, still find the going pretty rough, although a little better.

Pig iron and scrap are in improved supply; as also are brass and bronze ingots. Common labor supply is adequate, but skilled labor remains scarce.

Huge Machines Produce Motor Block Molds



WHAT are said to be the world's largest jolt-squeeze-strip molding machines have been placed in operation at the Sorbo-Cast Corp. foundry, New Brunswick, N. J. This model machine was developed by SPO Inc., Cleveland, for maximum speed and efficiency in producing massive copes and drags. It features push-button actuation of all operations and solenoid valve control of each step in the production cycle. At Sorbo-Cast it has been found that a pair of these machines have doubled production of truck motor block casting molds. Operating on standard air line pressure, each machine has a squeeze capacity of 80,000 lb and jolt capacity of 4000 lb. It stands 166 in. high overall, with 50 in. recessed below floor level. Flask space ranges from 32 x 38 to 50 x 54 in.

GRAY iron foundry casting production shows some gain. Foundries, however, have not been able to build up much backlog, and operations are still confined principally to around four days a week. Major exceptions are foundries producing machine tool castings. At such plants output averages five days a week, with backlogs increasing. Direct defense work remains light.

Steel foundries are operating at normal capacity. Defense and defense-support work accounts for much of their activity. Backlogs extend at least a few months. Malleable plants are not as active as steel foundries, but are busier than gray iron shops. Most malleable shops are on a five-day week, but are accumulating little in the way of backlogs. Overflow from the steel foundries is helping malleable where substitutions can be made.

Since around the middle of March there has been a stepping up in nonferrous castings demand for civilian needs. This has relieved the situation in a number of the small shops which have been finding it difficult to participate extensively in defense work due to the more rigid specifications involved.

Pig iron, scrap, coke and brass and bronze ingots are in adequate supply. Cast scrap and coke actually are in ample supply.

LET'S KICK IT AROUND

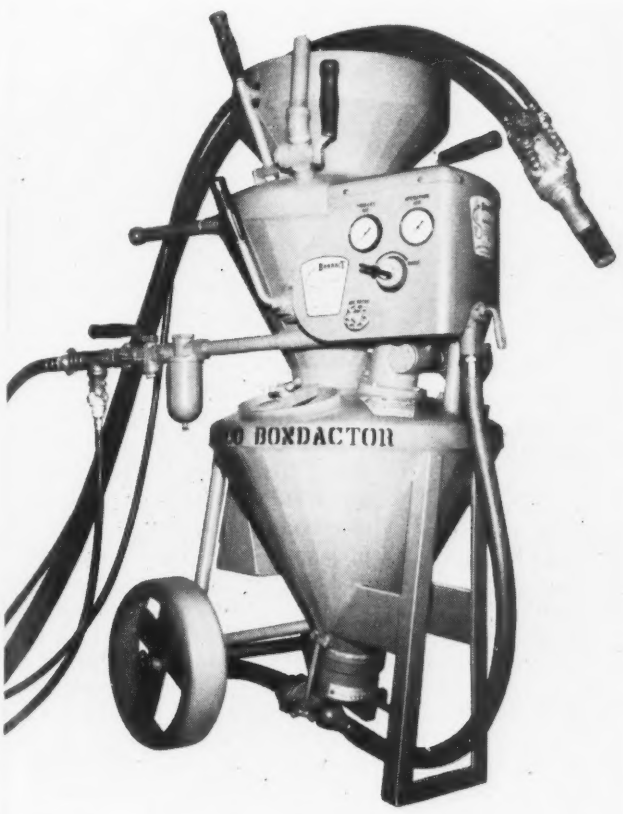
By TOM BARLOW

"Hi. What's new?"

Well, for one thing, it's convention time again. Good old Atlantic City—land of sea food, hot dogs and bathing beauties. Don't get your hopes up, son—they aren't there in May. (The bathing beauties, I mean).

Seems like every Foundry Show catches me a little short. We know a year in advance that there will be a show. But when the dead-line shows up, we aren't quite ready. I guess that's because we like to have something real new to show you or talk about. The new things always seem to mature about thirty minutes before the train leaves. Oh well, they tell me it's better than working for a living.

Besides the "brand new" we will also feature the BONDACTOR MACHINE again because it's still new to some people. At the last Foundry Show, the BONDACTOR was really a surprise. Few foundrymen had even heard of one, let alone seen one. Today the BONDACTOR is standard equipment in a



See the Bondactor Machine at Booth 1215 at the Convention

surprising number of foundry centers. In fact, thanks to steady improvements in Cupoline (the original and by far the most widely used gun refractory) we can now boast that over 50% of all the grey iron castings produced in this country come from cupolas patched with the BONDACTOR process.

Quite a record, don't you think? Do you blame us for being a little proud of "another E. C. P. first"? "First in quality, first in service. First in the development of new foundry practices". Quite a motto. After all, what was good enough for Washington (George) is good enough for us.

A favorite greeting between foundrymen is "Hi. What's new?" Of course, there are other greetings such as, "Hey, you", and "Have a beer", but "What's new?" is particularly good at a convention. In fact, I offer it to the AFS, at absolutely no charge, as a convention slogan. (I'm full of slogans today.) In our case, "What's new?" would refer to TRIPLACT. This new material is rapidly finding its place in the sun as a core and molding sand addition. (Also, rumored to be good on breakfast food and to increase the head on a glass of beer.) For the moment we can safely claim to stop veins and fins in cores as well as to improve the surface appearance. We actually have a number of customers using TRIPLACT in cores to eliminate the need for dips, washes or sprays. No kidding, you should see some of these cores. Smooth as a cold drink on a hot day.

In molding sand and facing, TRIPLACT reduces buckles, scabs and rat-tails. It improves the finish and speeds up cleaning. It provides higher flowability and eliminates lumpy sand and lumpy shakeout. It is wonderful on light castings but at the same time makes the most beautiful heavy flat-backs you ever saw. The really nice thing about TRIPLACT is that the sand is easy to control. Just add clay, water and TRIPLACT. No sea-coal, no anti-bonds, no stabilizers, no medicine. It's really the nuts.

Many people have asked where we got such a peculiar name for the stuff. Well, originally we knew TRIPLACT would do three things well. It improved finish, reduced scabbing and softened the shake-out. So it had a TRIPLE action—then TRIPL-ACT and finally TRIPLACT. We now can prove that this "wonder drug" has six actions but it's too late to change the trade mark. Besides, who would buy Sexact? Hmmm?

Oh yes, we will also be ready to tell you more about KORFLO and MOLD SPRAY. We'll even tell you something new about DURA. In fact, given a chance we could talk your arm off.

The chairs in Booth 1215, Convention Hall, Atlantic City are very comfortable, so make yourself at home. Take your shoes off and prop up your feet. Light your pipe and relax. Then just say, "Hi. What's new?"

I dare you.

EASTERN CLAY PRODUCTS
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20 NORTH WACKER DRIVE CHICAGO 6, ILL.

By EDWIN BREMER

Foundry DEVELOPMENTS

KEEPING pace with accelerated production at Fairchild Aircraft Division, Hagerstown, Md. a newly designed x-ray unit is speeding examination of approximately 2000 castings used in each Air Force C-119 Flying Boxcar. The equipment was designed by General Electric Co. and Fairchild inspection engineers who combined a semi-automatic radiographic machine with an automatic film developer. It features a lead-lined x-ray cabinet with automatic

New x-ray inspection unit combines a semi-automatic radiographic machine and automatic film developer

closing doors into which trays full of castings are fed manually.

In addition, a Pako Filmachine develops one film every 60 seconds with all steps in developing, washing and drying operating automatically on pre-set schedules. Installation of the new equipment has eliminated a second-shift inspection operation, increased tube time by about 50 per cent per 8-hr shift, and reduced in-work time from receiving to stores by 20 per cent. Anticipating that future changes in Air Force specifications will call for more radiographic inspection, Fairchild will propose a system of mapping individual castings, outlining critical areas to guide foundries in placing of gates, risers, etc. Fairchild engineers are also experimenting with possible use of high intensity fluoroscope with sensitivity approaching that of x-ray.

* * *

AGITATION for stricter enforcement of weight limitation regulations on highway trucks and more severe penalties for violations of such regulations is expected to lead to increasing use of magnesium alloy castings in truck construction. Present applications in some degree include wheels, wheel hubs, brake shoes and spiders, and spare tire holders. Other possibilities, mainly die castings, include oil pumps, clutch and transmission housings, parts for steering column assemblies, transmission parts such as valve plates, valve bodies, shifter guides, clutch pistons, and covers.

* * *

SYNTHETIC rubber compound is being used successfully to establish a previously unattainable bond between aluminum and nickel plate. The process for nickel-coating aluminum alloy propeller blades was developed jointly by Hamilton Standard Division, United Aircraft Corp., and Bart Laboratories Inc., Belleville, N. J. Bond material is sprayed on the aluminum, is dried and then the nickel applied by conventional means to the required thickness. Finished pieces have a hardness of 400 to 450 Vickers, and are stress-free. Semi-bright surface after plating can be polished to a high luster.

* * *

PROCEDURE to eliminate use of intricate cores in producing cylinder heads, blocks and crankcases in aluminum alloys is described in a paper by J. H. Dunn and E. P. White which was presented at a recent meeting of the Society of Automotive Engineers. The cylinder head is divided into four horizontal slices which are made in permanent molds, and later brazed together to form the complete head. With cylinder blocks, the division is made approximately on the centerlines of the cylinder bores. Such cylinder blocks would be "wet sleeve" construction, but for "dry sleeve" assembly an aluminum tube is brazed in for application of the cast iron liner, or a cast iron liner is brazed in directly when the sections are brazed together.

* * *

NEW ALUMINUM casting alloy which stands up well in equipment for high temperature service such as pistons for reciprocating aircraft engines, has been developed by Naval Research Laboratory. Containing cerium (mischmetal), the alloy is the result of a search of the many types of aluminum alloys to find one that stands up at temperatures of 700 to 800°F. It can be cast by standard foundry practice, and details are given in a report PB 105749 available from Office of Technical Services, Department of Commerce, Washington 25, for 75 cents.

* * *

MICA INDUSTRY in the United States may be freed from dependence on foreign sources by a development of the Chemical Division, General Electric Co., which permits utilization of domestic mica for a variety of electric insulating applications. Key is a special process by which minute mica flakes are treated so that a force is generated which holds the tiny particles together to form a continuous sheet 0.002 to 0.006-in. thick. Material may be impregnated with resins and bonded to paper, glass or cloth for greater strength and improved electrical properties.

* * *

HYDROGEN gas evolved during and after firing has been recognized as a cause of defects in porcelain enameled and ceramic coated steel. Recent National Bureau of Standards investigation using heavy hydrogen (deuterium) as a tracer now indicates that the water present in the frit used in the coating is largely responsible for the hydrogen-produced defects. Confirming experiments demonstrate the feasibility of producing a coating free from defects by using water-free frit.

* * *

PRODUCTION of aluminum alloy torque converter parts for the "Ultramatic" drive used by Packard necessitates close tolerances in molding. Made by the plaster molding process, the vanes and ports are formed by some 30 plaster cores, and since slight dimensional errors in individual cores could become cumulative, a technique was developed to limit the tolerances to plus or minus 0.005-in. on each.

HOW AMERICA Out-Produces THE WORLD
Logan Roller Conveyors, handling an endless stream of molds from molding machines to pouring stations, are an integral part of this mass production foundry set-up for aircraft engine parts.

2 American Industry { *"Originated the mass production idea, and constantly improves it"*

"Make 'em by the million" is a purely American expression, which in itself suggests huge economies and efficiencies.

Mass foundry production includes ingenious methods, improved molding equipment, skills developed through repetitive operations. All these are contributing factors in the cost-cutting mass production idea.

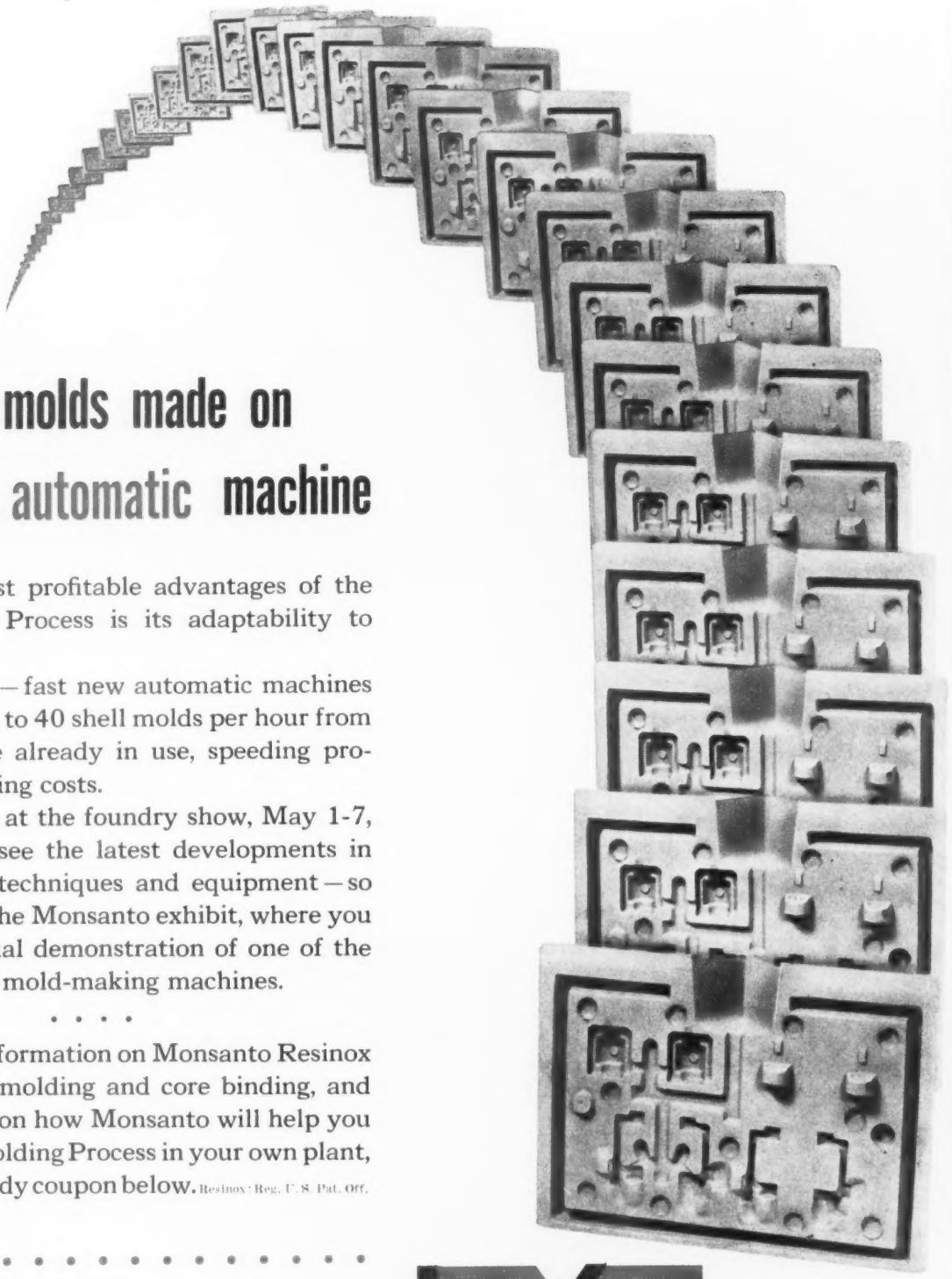
And handling equipment, like Logan Conveyors, is recognized as indispensable to mass foundry operations. Through every foundry and machining phase, Logan equipment speeds output, takes the strain off human shoulders, aids these American mass production processes.

Write today for literature, or for engineer to call.

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

At Monsanto's booth at the foundry show...



see shell molds made on new, fast, automatic machine

One of the most profitable advantages of the Shell Molding Process is its adaptability to mechanization.

For example—fast new automatic machines that produce up to 40 shell molds per hour from one pattern are already in use, speeding production . . . cutting costs.

While you're at the foundry show, May 1-7, you'll want to see the latest developments in Shell Molding techniques and equipment—so be sure to visit the Monsanto exhibit, where you will see an actual demonstration of one of the newest of these mold-making machines.

• • • •

Also—for full information on Monsanto Resinox resins for shell molding and core binding, and for information on how Monsanto will help you test the Shell Molding Process in your own plant, just mail the handy coupon below. Resinox: Reg. U. S. Pat. Off.

MONSANTO CHEMICAL COMPANY, Plastics Division, Room , Springfield 2, Mass.

☐ I would like to test the Shell Molding Process, please send me information on how Monsanto will help. ☐ Please send me information on Resinox resins for shell molding and core binding.

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SERVING INDUSTRY . . . WHICH SERVES MANKIND

By W. M. GRIMES
Vice President
Gartland Foundry Co.
Terre Haute, Ind.

Faster Hot Metal Handling

INCREASES FOUNDRY CAPACITY

THE Gartland Foundry Co., Terre Haute, Ind., is classed as a semiproduction gray iron foundry, producing light to medium castings from a fraction of a pound to 50 lb. A leading Midwest producer since the turn of the century, the company manufactures castings for electric motors, farm implements and other products for markets as far west and north as St. Louis and Chicago.

Until recently the plant was turning out 12,000 lb of castings a day, using an 84-in. cupola which has an estimated capacity well in excess of hot metal needs. Production averaged 1400 molds a day.

Absence of mechanical equipment for handling molten metal meant that the molders, after 6½ hours of squeezer molding, used 60-lb hand ladles to pour their own floors. In some instances, the metal had to be carried as far as 160 feet from the cupola.

Due to the rigors of hand pouring, the men knocked off molding to rest 15 to 20 minutes before the cupola was tapped; they needed the breather before starting to pour. Another problem arising from the plant's methods was a high employee turnover and excessive absenteeism.

Balance Sheet Affected

From the balance sheet standpoint, income suffered from production lost when the molders were required to pour, and again when they took the rest period before each heat. The balance sheet also was affected by a high scrap loss caused by the metal cooling between cupola and floor, and also by the poor competitive position these methods created for the company when bidding for business.

The best production possible with the old method of operation was an average of 12,000 lb of castings poured by the molders in 1½ hours. According to the plant's overall production records, man-hours per ton of output were excessive.

In establishing a long-range improvement program, the company sought to make the initial step one that would give the greatest production return for the capital investment made. After careful study, the larg-

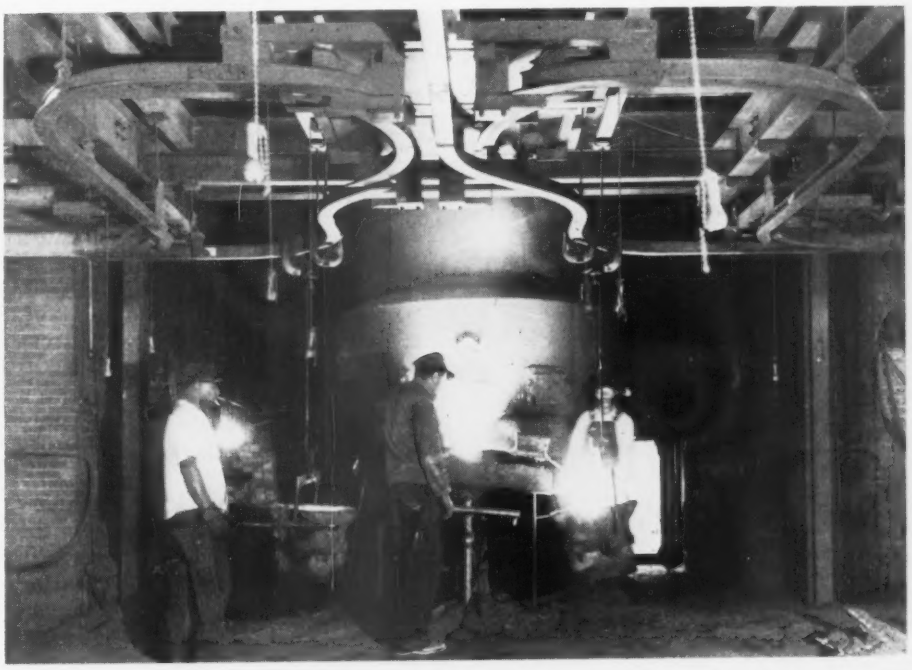

Fig. 1—Tramrail switch layout permits ladles to approach each side of tilting cupola spout simultaneously without delay or congestion

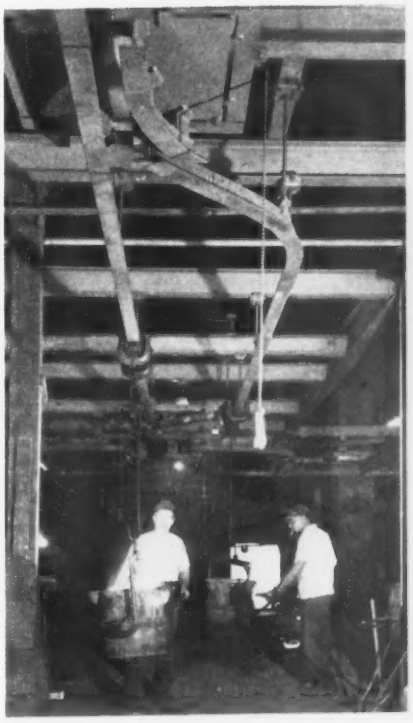

Fig. 2—Bull ladle side-tracked on "siding" gives right-of-way to loaded ladle leaving cupola

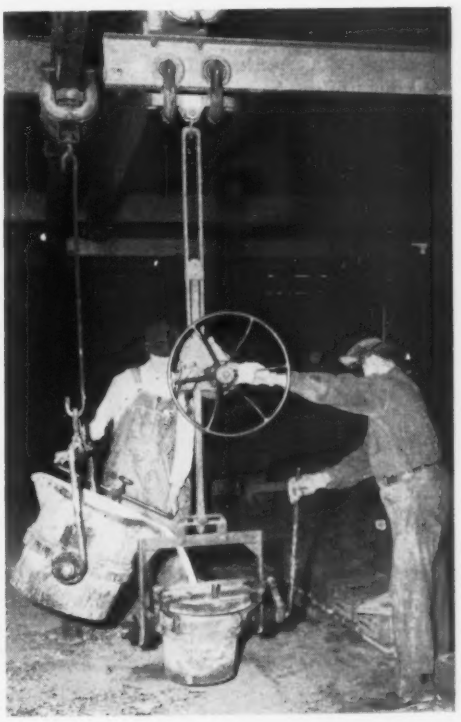

Fig. 3—Transferring hot metal from distributing line bull ladle to pouring ladle on bridge crane

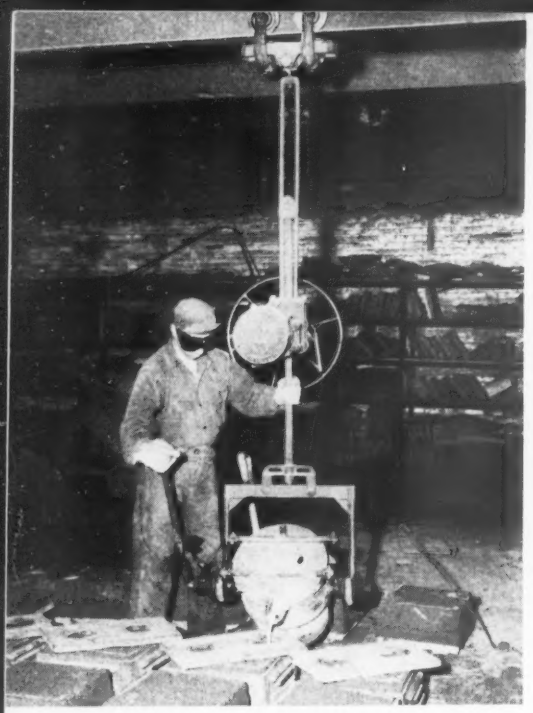

Fig. 4—A trolley-mounted covered pouring ladle rolls on crane bridge

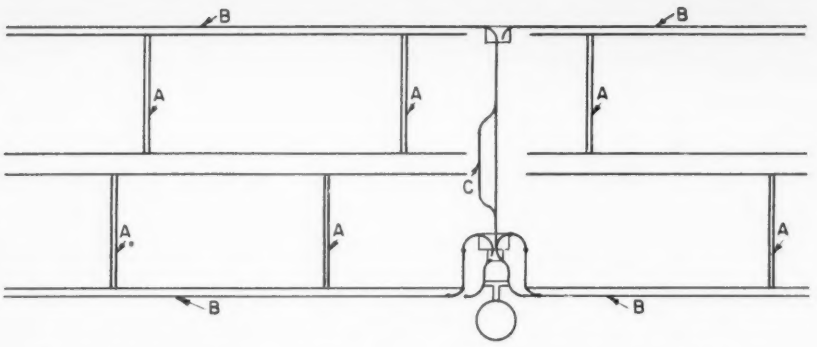

Fig. 5—Layout of hot metal handling system at Gartland Foundry Co. *A*—Bridge cranes, *B*—Tramrail feeder lines, *C*—Feeder line siding

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Assisting in eliminating congestion of bull ladles at the cupola is the 24-ft tramrail "siding," installed on the feeder line and employing two 45-degree switches. This enables empty ladles approaching the cupola to be side-tracked while the loaded ladles leaving the spout are given the right-of-way to the floors.

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(*Concluded on page* 214)

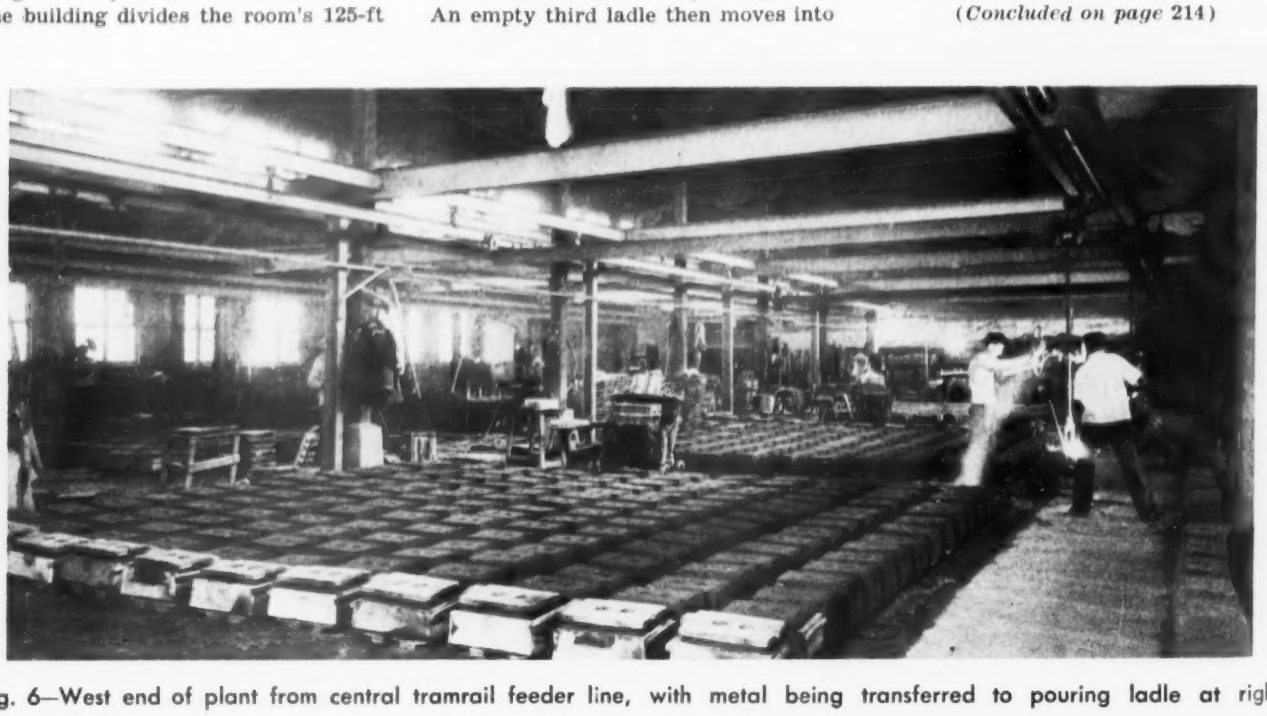


Fig. 6—West end of plant from central tramrail feeder line, with metal being transferred to pouring ladle at right

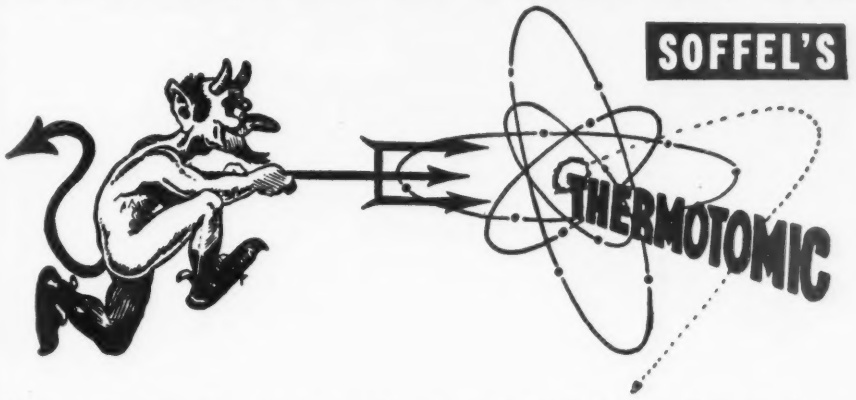
SOFFEL'S
New THERMOTOMIC-X
(Patented)

exothermic metal feeding compound

✓ CUTS CASTING COSTS

✓ MAKES BETTER CASTINGS

FOR STEEL, STAINLESS STEEL, GRAY OR NODULAR IRONS, COPPER, BRASS, BRONZE AND ALUMINUM



Riser feeding necks are reduced to one or two inch diameters.

Heads are knocked off without cutting or burning.

Eliminates shrinkage and piping in castings.

Thermotomic Compound is an exothermic material which is molded and baked into any desired shape just as sand cores are made. It produces a temperature of 3500° F. It is used as ring inserts under the risers or feeding heads, or as facing inserts where it is desirable to maintain the fluidity of the metal in the mold at those points where rapid cooling may cause piping, shrinkage or segregation. Great savings are realized through reduced riser dimensions and cleaning costs. For use in green sand molds, use Thermotomic WP (waterproofed). Soffel's Carbon-Free Liquidizer No. 5 is recommended for use with Thermotomic feeding compounds on top of the feeding heads. Thermotomic ABC and AL-X31 Liquidizer are recommended for aluminum.

EXOTHERMIC CARBON FREE LIQUIDIZER

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on ferrous and non-ferrous metals, and in ingot production. It is the first and the original scientific non-carbon exothermic compound for feeding heads and risers.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is different from ordinary head compounds in two ways: It is CARBON FREE, thereby eliminating carbon pick-up. It is EXOTHERMIC. Carbonaceous materials, regardless of their composition, will cause carbon pick-up, segregation, non-uniform grain structure and hard spots under risers and in castings. Carbonaceous materials contribute no added heat value or increased temperatures to the feeding metal and only act as an insulating cover.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. actually increasing the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. Shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms an insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads.

THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is for castings of iron and steel. A new exothermic compound which produces over 4000° F. of heat. It is used for dissolving and reducing skulls in ladles of iron and steel, also on the feeding heads and risers of castings and for ingot hot-topping.

SOFFEL'S THERMOTOMIC HOTOP will permit reducing feeding heads from 60 to 70% or the height as low as one-third the size of the diameter.

For ladle use when SOFFEL'S THERMOTOMIC HOTOP is applied to cold, sluggish metal of iron or steel on the surface of the metal, the exothermic action of THERMOTOMIC HOTOP increases the temperature several hundred degrees and adds fluidity. It will save much metal which would have been discarded as scrap. THERMOTOMIC HOTOP is guaranteed not to change the chemical analysis of iron or steel, as it is carbon free and is recommended only for ferrous use.

Beware of Imitations: **We are the originators of Exothermic Carbon Free Liquidizers and Patented Thermotomic Compounds.**

PITTSBURGH METALS PURIFYING COMPANY

Manufacturers of Quality Fluxes and Purifiers for All Metals and Alloys

1352 MARVISTA ST., N.S. PITTSBURGH 12, PA.

Herman MOLDING

help make this foundry a good place to work...

because

"Since the installation of a pair of 1500 lb. Jarr Rollover Herman Molding Machines, we at Farrell-Cheek have established new production records, far in excess of any previous achievement.

These Herman Machines not only enabled us to increase production, but they produce more accurate and uniform molds, which in turn result in top quality castings. This is further reflected by lower cleaning costs and better delivery.

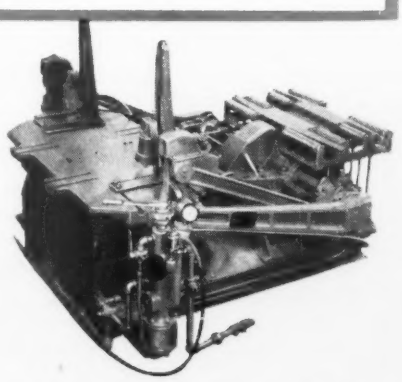
The simplicity of operation has made them popular with our molding machine operators, also with our maintenance department, who report the operating cost has been very low.

Our experience has been so highly satisfactory, that we now have additional Hermans on order, as we realize what we have missed in the past by not having the benefit of their efficient performance."

F. A. KINGSEED, FARRELL-CHEEK STEEL COMPANY

The comments above, made by Mr. F. A. Kingseed, Foundry Superintendent of Farrell-Cheek Steel Company, Sandusky, Ohio, were prompted by experience . . . the experience of *using* Herman Molding Machines.

At Farrell-Cheek Steel Company, as in countless foundries in the United States and abroad, Herman Molding Machines have made their way by the way they're made.



Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO. · UNION BANK BUILDING, PITTSBURGH 22, PA.

MACHINES

This Foundry

IS A GOOD PLACE TO WORK

Farrell-Cheek Steel Co.

Visitors to this 41-year old Sandusky, Ohio, plant see ample proof that it is a good place to work. Its up-to-date, well-kept buildings, modern equipment, locker and washrooms, canteens and other facilities are designed for employee welfare and comfort.

Covering 2 full city-blocks, Farrell-Cheek produces a wide variety of steel castings for road building machinery, power shovels, etc., as well as a specialty-line of stoker screws, chain and other items.

A full-time nurse is in attendance each day. Insofar as possible, all back-breaking manual labor has been eliminated by mechanized conveyors, sand handling systems, and other equipment. Elaborate dust collection apparatus is used. Concrete and wood floors are everywhere throughout the plant. Farrell-Cheek has an expert safety director in charge of employee and plant safety. Better than 10% of its 500 employees have been with the company for 25 years or more and 75% have been there 15 years or more.

Herman Molding Machines, like the 1500 lb. jarr rollover illustrated, are doing their share to help make Farrell-Cheek a good foundry in which to work. Approximately one minute is required to jarr, rollover and draw the pattern. All Hermans are safe and easy to operate, one rotary valve handle controlling the complete cycle.

Of most importance, Herman Molding Machines have made their way by the way they're made.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Herman

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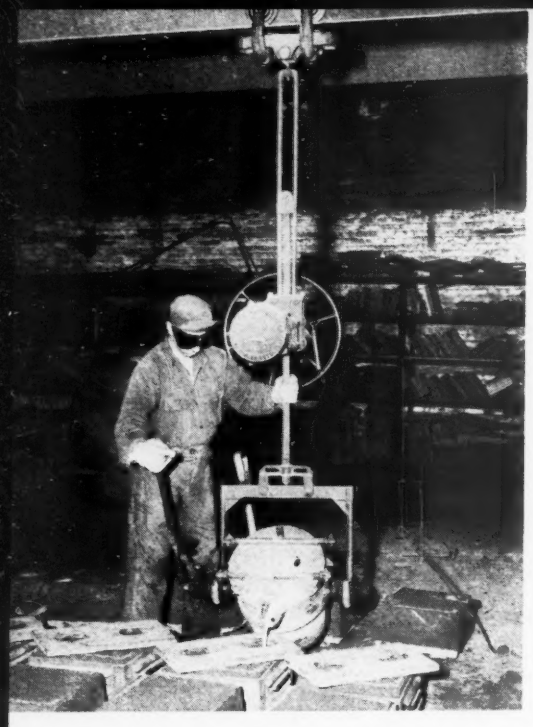

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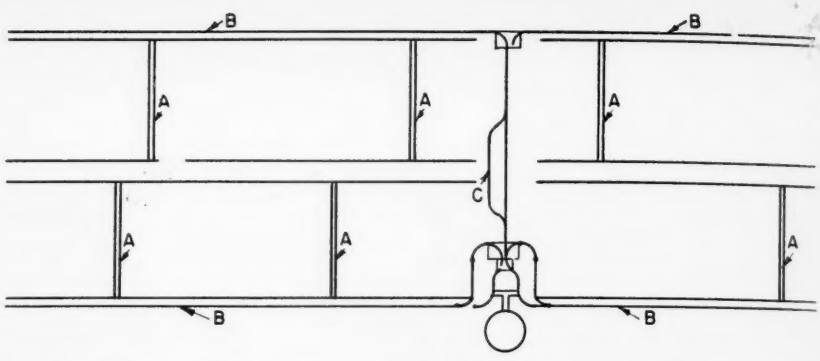

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(*Concluded on page* 214)

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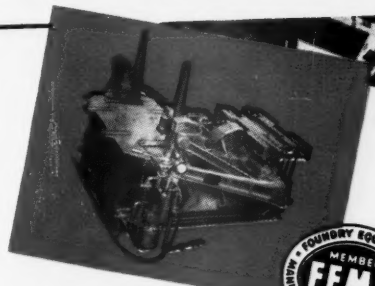

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The ad reproduced here-with originally appeared in the October, 1951 issue of FOUNDRY.

(*Concluded from page 210*)

into 20 floors of which 10 are located in the 61 x 200-ft center section. The other ten floors are located at each side of the plant in 32-ft-wide bays which extend the 200-ft length of the room.

Four crane runways cover the center section, in effect creating four main pouring areas. Two 100-ft runways with 24-ft spans extend parallel along the west end of the plant. At the opposite end of the foundry two similar crane runways 60 ft long are used. The two runways at the west end of the plant each carry two underslung tramrail bridge cranes equipped with trolley-mounted pouring ladles. The two cranes each serve three floors so that of the six main floors at the west end of the plant, four may be poured simultaneously. Each of the two runways at the east end is equipped with one tramrail bridge crane. Each crane is equipped with a trolley-mounted pouring ladle and is sufficient to serve the two floors located under each crane.

Hot iron is moved from the cupola over the tramrail distribution system to the pouring cranes. The distribution tramrail line parallels the crane runways from which it is separated by 1½ ft. By extending the bridge crane 12 in. beyond the runway, the pouring ladles and bull ladles may be lined up anywhere along the runways for a quick transfer of metal (Fig. 3).

Ten floors are located along the 32-ft-wide wall bays, six along the north wall and four along the cupola wall. These are located across the tramrail distribution line from the crane runways and are beyond the direct service of the bridge cranes. However, production of these floors also has been improved, since the four tramrail distribution lines also serve them. The molders use 60-lb hand ladles for pouring but obtain their hot iron from the bull ladles moved adjacent to their floors. Under the existing arrangement, the molders do not leave their floors once a heat has started. Pouring is uninterrupted except for the time required to fill the covered pouring ladles from the bull ladles on the distribution line at the end of the crane bridge.

Shows Marked Improvement

One of the advantages of this installation was the immediate increase in production capacity. As a result of the greatly increased efficiency, the company found it possible to add six molders to its original crew, bringing the number of floors to 20.

The improvement in the metal handling methods in conjunction with the augmented work force within 30 days after the installation resulted in a 33 per cent reduction in pouring time, a 91 per cent increase in tonnage handled and more than a 64 per cent increase in number of molds produced. This meant that, instead of 14 men pouring 12,000 lb in 1½ hours, 20 men were pouring 23,000 lb in 1 hour. It also eliminated the rest period the men formerly took before the heat.

As a result, the plant gains 15 direct labor hours per shift with the 20 molders now used, or an extra 11 to 12 molds per man per shift. In addition, the metal now reaches the floor at a higher pouring temperature which has reduced scrap loss. A preliminary study indicates that the increased capacity with the augmented work force can add over $100,000 to annual sales for the company with improved quality of castings and a definite improvement already felt in personnel relations. Current production records show that man-hours per ton of castings have already dropped 23 per cent.

PARASPRAY
SAVES LABOR — CUTS REJECTS
LOWER COSTS — BETTER CASTINGS — MORE CUSTOMERS
THE MODERN MOISTUREPROOF CORE AND MOLD SURFACE CONDITIONER FOR
GREEN OR DRY SAND CORES & MOLDS — MATCHPLATES — CHILLS, INSERTS AND SPRUES

PARASPRAY is a scientifically prepared, ready-to-use, fast-drying, liquid chemical formulation designed for easy and quick application to molds, cores, chills and inserts by spraygun, dipping or brush.

Advantages of Paraspray

- Makes smoother castings and saves cleaning labor.
- Reduces blows, kicks, rat-tails and surface defects.
- Stabilizes moisture content.
- No baking—no torching.
- Allows rougher handling.
- Cuts porosity and gas hole losses—denser castings.
- Produces hard, dry moisture-proof surfaces with uniform strength.
- Permits storage without absorption or loss.
- Prevents surface oxidation.

Why Paraspray Is Different

- PARASPRAY, basically a waterproof cement, quickly and tightly *BINDS* together loose grains of sand on the surface of cores and molds.
- PARASPRAY fills a necessary requirement in *MOLD ATMOSPHERE CONTROL*. It completely gasifies at about 400° F. leaving a thin film of amorphous carbon. The inert gas formed replaces *AIR* in mold cavity, providing *A DE-OXIDIZED ATMOSPHERE* which prevents oxidation of surface of molten metal.
- PARASPRAY provides complete moisture control. *A PARASPRAY* film on surface of core or mold, *PREVENTS MOISTURE* absorption or loss from molds in green sand work; especially where synthetic sands are used.
- PARASPRAY is the ideal carrier for graphite, silica, mica, zircon flour and other materials used as core and mold surfacing agents to produce smoother castings.

WRITE DEPT. F3 FOR LITERATURE

Also ask about PARACOAT for patterns and coreboxes and BONISPRAY, the permanent mold and die dressing.

Para Products Have A Place in Every Foundry

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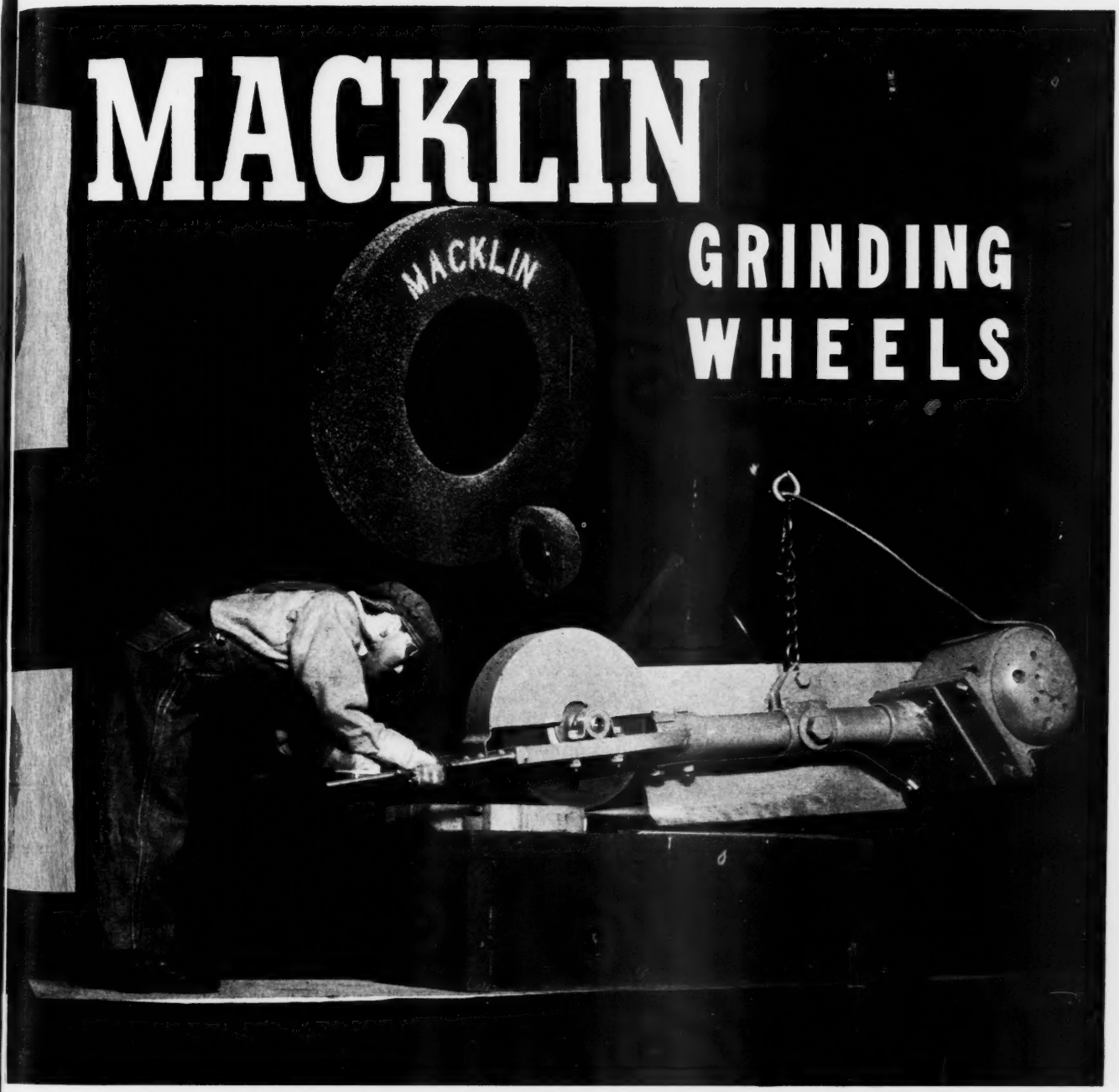
GRINDING WHEELS



MACKLIN Grinding Wheels will "Protect your Production" on all types of grinding jobs. Wheels of proper grain, grade and structure for swing frame grinders give fast and cool cutting action and long life. MACKLIN grinding wheels are economical and efficient for all foundry operations.

See Macklin's A-C-T-I-O-N exhibit - Booths 413 and 415 at the Foundry Show - Atlantic City - May 1st to 7th

1927 SILVER 25th ANNIVERSARY 1952

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS AND OTHER ABRASIVE PRODUCTS

JACKSON, MICHIGAN

MACKLIN GRINDING WHEELS

Sales Offices - Birmingham - Buffalo - Chicago - Cincinnati - Cleveland - Columbus - Detroit - Flint - Houston
Indianapolis - Los Angeles - Milwaukee - Moline - New York - Philadelphia - Pittsburgh - St. Louis

Industry BRIEFS

HEWITT-ROBINS INC., New York 17, has acquired Korb-Pettit Wire Fabrics & Iron Works, Philadelphia, maker of woven screen cloth and wire conveyor belts used in conjunction with Hewitt-Robins' belt conveyors, vibrating machinery and materials handling systems. H. M. Ross, engineering manager of Robins Conveyors Division, is in charge of Korb-Pettit. John Belli is manager-sales operations and F. J. Valkommer is production superintendent.

* * *

American Chain & Cable Co., Bridgeport 2, Conn., has formed Acco Casting Division, which will be responsible for sales of steel, gray iron and malleable castings. Inquiries and orders for malleable should be directed to American Chain & Cable Co., York Malleable Foundry, York, Pa., and those for steel, gray iron and nickel resistant castings to Acco Casting Division, American Chain & Cable Co., Reading, Pa.

* * *

Perfect Circle Corp., Hagerstown, Ind., has completed purchase of Centrifugal Foundry Co., Muskegon, Mich., which will be operated under its own name as a wholly owned subsidiary of the parent company. W. B. Prosser, Perfect Circle vice president and general manager, is president of the Muskegon organization, while its former president, A. G. Anderson, becomes vice president and general manager.

* * *

Koppers Co., Pittsburgh, which heretofore has produced piston rings for the automotive industry, will confine its piston ring operations to expanding production of aircraft and industrial rings only. These include aircraft, marine, commercial engine, railroad and oil field applications.

* * *

Green Fuel Economizer Co., Beacon, N. Y., has acquired U. S. patent rights for dust collectors made by Aerodyne Atlantic Corp., New York. Collectors will be sold and distributed by the Aerodyne Division of Green Fuel. Engineering research and development will be carried on at Beacon. Co-operating companies Aerodyne Development Corp., Cleveland, and Aerodyne Detroit Co., Detroit.

* * *

Worthington Corp., Harrison, N. J., is the new name of Worthington Pump & Machinery Corp. History of the company dates back to 1840 when Henry R. Worthington invented and started manufacturing steam pumps. Since then the company's activities have become widely diversified, making products for a number of industries. The name change does not affect corporation policies or practices.

* * *

Arcola Foundry & Mfg. Co., Arcola, Ill., has moved its plant and personnel to Salem, Ill. Plant produces small, medium and heavy gray iron castings. W. A. Jackson is president-treasurer, H. C. Irle, vice president, Paul M. Diekemper, vice president-secretary, and R. D. Gansmann, superintendent.

* * *

Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg., has appointed Brungart-Jennings Inc., 1306 First Ave., Birmingham, to handle sales and service of its trucks and mobile cranes in Alabama and northwest Florida. Newton Brungart and George Jennings head the new dealership.

* * *

Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y., has licensed Aluminum Co. of America, Pittsburgh, and Bohn Aluminum & Brass Corp., Detroit, to use Fairchild's process of molecularly bonding aluminum to ferrous metals.

* * *

Name of Roots-Connersville Blower Corp., Connersville, Ind., has been changed to Roots-Connersville Blower, a Division of Dresser Industries Inc., Dallas, Tex. Roots-Connersville will continue to operate as a separate, completely integrated organization at the same address, with no change in plant facilities or organization. Robert H. Owens is division president and Ralph Newquist executive vice president.

* * *

Barber-Colman Co., Rockford, Ill., has acquired Wheelco Instruments Co., Chicago, maker of indicating, recording and controlling instruments and combustion safeguards. Current operations will continue in Chicago until manufacturing facilities can be transferred to Rockford. No changes are contemplated in Wheelco's national sales and service organization.

* * *

Bumgardner & Co., Wheeling, W. Va., has acquired the plant of the former Wheeling Sanitary Mfg. Co. in suburban Elm Grove. Operations will be transferred to the Elm Grove site in the near future. J. W. Bumgardner is company president; W. A. Bumgardner, is vice president-general manager; Clark Douglas, superintendent, and H. A. Bumgardner, secretary-treasurer.

* * *

Basic Refractories Inc., Cleveland, has acquired the physical assets of Sierra Magnesite Co. of Nevada, as well as a lease to mining claims adjoining its own property at Gabbs, Nev. Substantial additional reserves of developed magnesite are now provided for use in production of granular magnesia refractories used in industry for basic linings and furnace hearths.

* * *

Trojan Foundries, 3117 Oak Lan Dallas, Tex., has purchased Southwest Pattern Works, 726 East Cla endon Ave., Dallas. Joe Cohen, fo mer pattern works owner, is gener manager in charge of production f both foundry and pattern operation Wayland Boles is Trojan presiden

* * *

Harnischfeger Corp., Milwaukee, has acquired a 4-acre tract at 1629 Vanderbilt Rd., Birmingham, on which it plans construction of a warehouse and office and future construction of a manufacturing plant.

* * *

Specialloy Inc., Chicago, manufacturer of alloy additions and products, has moved into a newly constructed plant at 4025 South Keeler Ave.

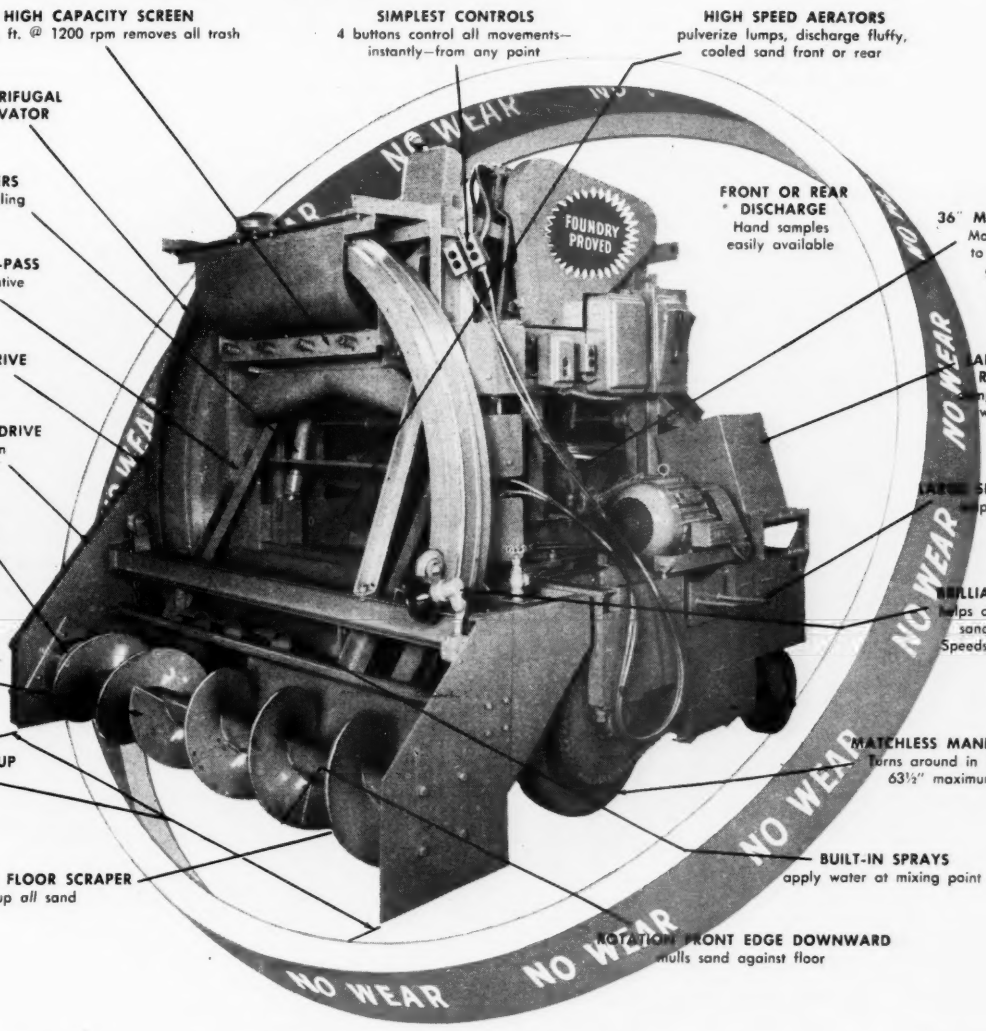
* * *

Titanium Co. of America has been formed by Edward S. Christiansen, president, Christiansen Corp., Chicago.

(*Concluded on page* 218)

YOU CAN HAVE

Better Sand at Lower Cost with ...Ringlift RF 34*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12 sq. ft. @ 1200 rpm removes all trash
SIMPLEST CONTROLS
4 buttons control all movements—instantly—from any point
HIGH SPEED AERATORS
pulverize lumps, discharge fluffy, cooled sand front or rear
LIFETIME CENTRIFUGAL LIFTRING ELEVATOR
HYDRAULIC CYLINDERS
raise machine for straddling
VISUAL DRY SAND BY-PASS
continually indicates relative moisture content
TOTALLY ENCLOSED DRIVE
oil lubricated
CONTROLLED TORQUE DRIVE
prevents damage from overlooked castings
SEALED SELF-ALIGNING BEARINGS
screws move sand away from bearings and drive
OPPOSED THRUST
generates powerful mixing-mulling effect
85⅛" WIDE PICKUP
Any height. Saves labor
AUTOMATIC FLOOR SCRAPER
picks up all sand
FOUNDRY PROVED
FRONT OR REAR DISCHARGE
Hand samples easily available
36" MAGNETIC SEPARATOR
Material uniformly fed to large surface area gives unsurpassed iron removal
LARGE PIVOTED REFUSE BOX
dumps directly into wheelbarrow
LARGE SHOT-IRON DRAWER
empties in seconds
BRILLIANT LIGHTING
helps operator judge sand condition. Speeds maneuvering
MATCHLESS MANEUVERABILITY
Turns around in 10 seconds. 63½" maximum radius
BUILT-IN SPRAYS
apply water at mixing point
ROTATION FRONT EDGE DOWNWARD
mulls sand against floor
NO WEAR

The RINGLIFT Prepares More Floors Per Hour

HIGH CAPACITY—up to a ton or more per minute—gives more working time output. The design features above reduce non-productive time, extra incidental labor, and maintenance expense. Only the RF34 will pile the sand at the wall without prior windrowing. It will also place the sand in windrows of length desired.

THOROUGHLY MIXED and six times aerated, Ringlifted sand is clean, uniform, strong, flowable, fluffy and cool. More molds per molder, reduction in special facings, better finish, less scrap, cleaner shakeout, less pattern wear, reduction in bond additions are benefits obtained by Ringlift users.

FOUNDRY PROVED in four years of development and severest test Ringlift machines are now used in some of America's foremost foundries—foundries that must have the best possible sand economically for production of highest quality castings.

SEE IT! BOOTH 1833

*Other Models available are the B24, B34, B36, C36, RF24

STATES ENGINEERING CORPORATION
WRITE TO
922 W. Berry Street
Fort Wayne 6, Indiana

(*Concluded from page* 216)

New firm will manufacture titanium wrought products and will be located in East Chicago, Ind., where another subsidiary company, Magnesium Co. of America, has headquarters.

* * *

Acme Aluminum Foundry Co., 6843 S. Bell Ave., Chicago, recently completed and occupied a one-story, 60 x 60-foot addition to its plant. This houses increased facilities for heat treating, dichromating and finishing of aluminum and magnesium castings.

* * *

Peasley Products Inc., since 1946 located at 151 Connecticut Ave., Bridgeport, recently moved into its own building at 993 Honeyspot Rd., Stratford, Conn.

* * *

Layton Park Pattern Works Inc., Milwaukee, has been incorporated by Steven Grundkowski, Herbert A. Kussrow, Herbert L. Mueller and Bruno Radish.

* * *

Industrial Foundry & Mfg. Co., Schoolcraft, Mich., suffered $200,000 fire loss Mar. 14, when all buildings were leveled and all patterns destroyed.

Four Steel Foundries Earn Perfect Safety Records

Perfect safety records were achieved by four foundries during 1951 and exceptionally low accident frequency rating shown by twelve others, according to a report issued by Steel Founders' Society of America, Cleveland.

Heading the list was Hughes Tool Co., Houston, Tex., which completed its fourth successive year of accident-free operation. The other three with clear 1951 records were: Eastern Malleable Iron Co., Wilmington, Del.; Quincy Steel Casting Co., North Quincy, Mass., and Weatherly Steel Castings Co., Weatherly, Pa. For the latter two companies, it was the second successive year of operation without a single lost-time accident.

The next 12 companies had accident frequency ratings of less than ten per 1 million man-hours of exposure.

Offers Aluminum Data

Reynolds Metals Co. has published a new index listing technical literature and motion pictures on the metalworking industry. Literature listed under the headings: Desig Fabrication, Applications, Produc and General Information. All have do with how to use aluminum mo effectively.

Seven motion pictures are liste They are 16 mm films, most of the in sound and full color.

Copies of the index may be secure from Reynolds Metals Co., Dea 2500 South Third St., Louisvill

MIT To Offer Courses In Spectroscopy

Two one-week specialized train programs in infrared spectros will be offered June 16-20 and 23-27 as part of the 1952 sum session at Massachusetts Institute Technology. Dr. Richard C. Lord Dr. Foil A. Miller, both of the M spectroscopy laboratory, will con the two courses.

First week's program will be d voted to techniques of infrared spe troscopy. Afternoon laboratory exe cises will be carried out by small groups with a variety of infrared instruments and related equipment. The second week will cover theory of infrared absorption by molecules interpretation of infrared absorption spectra and relation between spectra and molecular structure.

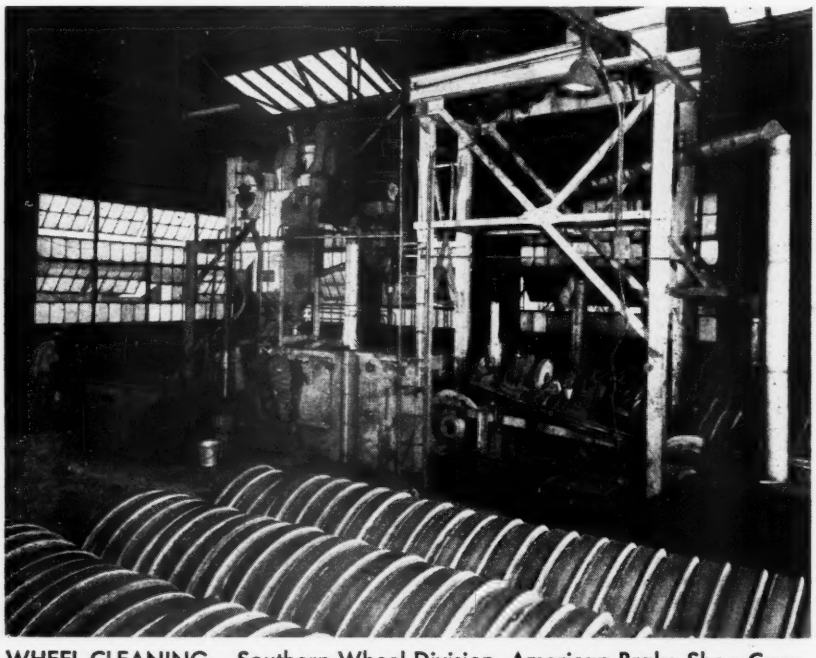
Application forms may be obtained from Dr. Ernest H. Huntress, director of the summer session, Room 3-107 Massachuetts Institute of Technology Cambridge 39, Mass.

Book Review

Plant Layout, by Randolph W. Mallick and Armand T. Gaudreau, cloth 391 pages, 6¼ x 9¾ in., publi John Wiley & Sons Inc., Nev Price $7.50.

Written with the viewpoint of administrative executive and p gineer in mind, this book p the principles and practice o ning, designing and presentin layout projects covering relayo new plants. Such things as de ing plant capacities, balanc machine operations and equippi stations are considered alo the design of production and a lines; receiving, shipping, a age areas; dispatch stations a rooms; materials handling s service facilities, and office

The book closes with a dis on evaluating capital outlays fo and equipment; operating costs and projected savings; proposals for presentation to management, and a case presentation of layout proposals for a foundry.



WHEEL CLEANING: Southern Wheel Division, American Brake Shoe Corp., Birmingham, has installed a special airless blasting cabinet, designed by American Wheelabrator & Equipment Corp., Mishawaka, Ind., which removes sand and scale from cast railroad wheels in 30 seconds. Each wheel is rolled onto a loading mechanism which raises the wheel and permits it to roll into the cabinet and onto spinner rolls. The rolls rotate the wheel under the blast stream of steel shot. An elevator expels the cleaned wheel to a grinding operation for removal of burrs and ragged edges. Accompanying view shows the complete production cleaning line with a cleaned wheel emerging from the blasting cabinet. Photo courtesy American Wheelabrator & Equipment Corp.

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Technical Assistance Available—if you have sulfur problems with your grey or malleable iron castings, we invite you to write to SOLVAY's foundry consultant. There is no charge or obligation for this service.

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STANDARD SPECIFICATIONS FOR STEAM OR VALVE BRONZE CASTINGS

ASTM Designation: B 61—51

Adopted, 1928; Revised, 1936, 1940, 1941, 1942, 1944, 1946, 1949, 1951

Scope

1. This specification covers a high-grade steam metal or valve bronze alloy used for component castings of valves, flanges and fittings.

Basis of Purchase

2. This specification covers castings used in products manufactured in advance and supplied for sale from stock by the manufacturer, jobber or other dealer. Orders for such products shall prescribe the alloy by specification number, together with a request for certification as may be desired (Sections 3, 5, 9 and 12).

Chemical Composition

3. The alloy shall conform to the requirements as to chemical composition prescribed in Table 1.

Chemical Analysis

4. (a) Not less than two chemical analyses shall be made from different heats, from each day's melt.[1]

(b) The sample of chemical analysis shall be taken by drilling or cutting the chemical test coupon in such a manner as to be representative of the entire cross-section. For purpose of analysis only, the chemical test coupon may consist either of a tension test coupon, or of a separate sand or chill cast coupon as may be desired.

Tensile Properties

5. The alloy shall conform to the requirements as to tensile properties prescribed in Table II.

Test Coupons and Specimens

6. The tension test coupons and specimens for tension test shall be prepared in accordance with the Tentative Recommended Practice for Tension Test Specimens for Copper-Base Alloys for Sand Castings (ASTM Designation: B 208).

Number of Tests

7. (a) Not less than two tension tests, from different heats, shall be made from each day's melt.[1]

(b) If any test specimen shows defective machining or reveals casting defects, it may be discarded and replaced by another specimen.

Significance of Numerical Limits

8. For purposes of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed value or a calculated value shall be rounded off as indicated in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29).

Property	Rounded-Off Unit for Observed or Calculated Value
Chemical composition	Nearest unit in the last right-hand place of figures
Tensile strength; Yield strength	Nearest 1000 psi
Elongation: 5 per cent and over	Nearest 1 per cent

Hydrostatic Test

9. Castings, as assembled component parts of valves, flanges, or fittings, shall conform to such requirements as to pressure tests as may be prescribed by codes applying to the products under consideration.

Workmanship and Finish

10. (a) The castings shall be free from injurious blowholes, porosity, shrinkage defects, cracks, or other injurious defects. They shall be smooth and well cleaned.

(b) Pressure castings shall not be plugged, welded, burned in or impregnated.

(c) Wall thicknesses and sections shall meet or exceed the minimum requirements of applicable codes.

Marking

11. Valves, flanges, and fittings shall be marked in accordance with the latest revision of the Standard Marking System for Valves, Fittings, Flanges and Unions (No. SP-25) of the Manufacturers Standardization Society of the Valve and Fittings Industry, and in such position as not to injure the usefulness of the casting.

Certification

12. (a) Records of tension test results and chemical analyses shall be systematically made and maintained and shall be the basis for certification. In lieu of the manufacturer's certification and upon written request on the purchase order by the purchaser these records may be examined by the purchaser or his accredited representative, upon the manufacturer's premises.

(b) Upon written request on the purchase order, the purchaser or his accredited representative shall have the right of entry to foundries and testing laboratories to assure himself that the facilities and procedures of the manufacturer of the component castings are suitable as a basis for production of castings and for preparation of certification as described in paragraph (a).

(c) Component-part alloy castings as made to this specification are manufactured in advance and supplied from stock. The manufacturer therefore maintains a general quality certification of all castings, without specific record or date of cast of a specific component part. When component parts are required to specific dates or heats, a supplementary agreement on the purchase order is necessary between the purchaser and the manufacturer.

Table 1—Chemical Requirements

NOTE.—Analyses shall regularly be made only for the elements designated in boldface type. However, the presence of the other named elements outside of the limits specified in this table constitute cause for rejection of the castings.

	Minimum	Maximum
Copper, per cent*	86.0	90.0
Tin, per cent	5.5	6.5
Lead, per cent	1.0	2.0
Zinc, per cent	3.0	5.0
Nickel, per cent	...	1.0
Iron, per cent	...	0.25
Phosphorus, per cent	...	0.05

* In determining compliance with the requirement as to minimum copper content, copper may be computed as copper plus nickel, to the nickel limit prescribed.

[1] A day's melt shall mean a normal day, one shift, not to exceed 10-hr over-all melting period. When two or more shifts are used each shift shall be considered the equivalent of a day's melt.

Table II—Tensile Requirements

Tensile strength, min., psi	34000
Yield strength, min., psi*	16000
Elongation in 2 in., min., per cent	22

* Yield strength shall be determined as the stress producing an elongation under load of 0.5 per cent, that is, 0.01 in. in a gage length of 2 in.

STANDARD SPECIFICATIONS FOR COMPOSITION BRASS OR OUNCE METAL CASTINGS

ASTM Designation: B 62—51

Adopted, 1928; Revised, 1936, 1941, 1944, 1946, 1949, 1951

Scope

1. This specification covers an alloy having a composition of copper tin, lead and zinc, used for component castings of valves, flanges and fittings. The common trade name of this alloy is 85-5-5-5.

Basis of Purchase

2. This specification covers castings used in products manufactured in advance and supplied for sale from stock by the manufacturer, jobber or other dealer. Orders for such product shall prescribe the alloy by specification number, together with a request for certification as may be desired. (See Sections 3, 5, 9 and 12.)

Chemical Composition

3. The alloy shall conform to the requirements as to chemical composition prescribed in Table I.

Chemical Analysis

4. (a) Not less than two chemical analyses shall be made from different heats, from each day's melt.[1]

(b) The sample for chemical analysis shall be taken by drilling or cutting the chemical test coupon in such a manner as to be representative of the entire cross-section. For purpose of analysis only, the chemical test coupon may consist either of a tension test coupon, or of a separate sand or chill cast coupon as may be desired.

Tensile Properties

5. The alloy shall conform to the requirements as to tensile properties prescribed in Table II.

Test Coupons and Specimens

6. The tension test coupons and specimens for tension tests shall be prepared in accordance with the Tentative Recommended Practice for Tension Test Specimens for Copper-Base Alloys for Sand Castings (ASTM Designation: B 208).

Number of Tests

7. (a) Not less than two tension tests, from different heats, shall be made from each day's melt.[1]

(b) If any test specimen shows defective machining or reveals casting defects, it may be discarded and replaced by another specimen.

Significance of Numerical Limits

8. For purposes of determining compliance with the specified limits for requirements of the properties listed in the following table, an observed value or a calculated value shall be rounded off as indicated in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29).

Property	Rounded-Off Unit for Observed or Calculated Value
Chemical composition	Nearest unit in the last right-hand place of figures
Tensile strength; Yield strength	Nearest 1000 psi
Elongation: 5 per cent and over	Nearest 1 per cent

Hydrostatic Test

9. Castings, as assembled component parts of valves, flanges, or fittings, shall conform to such requirement as to pressure tests as may be prescribed by codes applying to the products under consideration.

Workmanship and Finish

10. (a) The castings shall be free from injurious blowholes, porosity, shrinkage defects, cracks, or other injurious defects. They shall be smooth and well cleaned.

(b) Pressure castings shall not be plugged, welded, burned in or impregnated.

(c) Wall thicknesses and sections shall meet or exceed the minimum requirements of applicable codes.

Marking

11. Valves, flanges, and fittings shall be marked in accordance with the latest revision of the Standard Marketing System for Valves, Fittings, Flanges, and Unions (No. SP-25) of the Manufacturers Standardization Society of the Valve and Fittings Industry, and in such position as not to injure the usefulness of the casting.

Certification

12. (a) Records of tension test results and chemical analyses shall be systematically made and maintained and shall be the basis for certification. In lieu of the manufacturer's certification and upon written request on the purchase order by the purchaser these records may be examined by the purchaser or his accredited representative, upon the manufacturer's premises.

(b) Upon written request on the purchase order, the purchaser or his accredited representative shall have the right of entry to foundries and testing laboratories to assure himself that the facilities and procedures of the manufacturer of the component castings are suitable as a basis for production of castings and for preparation of certification as described in Paragraph (a).

(c) Component-part alloy castings as made to this specification are manufactured in advance and supplied from stock. The manufacturer therefore maintains a general quality certification of all castings, without specific record or date of cast of a specific component part. When component parts are required to specific dates or heats, a supplementary agreement on the purchase order is necessary between the purchaser and in the manufacturer.

Table I—Chemical Requirements

Note.—Analysis shall regularly be made only for the elements designated in boldface type. However, the presence of the other named elements outside of the limits specified in this table constitute cause for rejection of the castings.

	Minimum	Desired	Maximum
Copper, per cent*	84.0	85.0	86.0
Tin, per cent	4.0	5.0	6.0
Lead, per cent	4.0	5.0	6.0
Zinc, per cent	4.0	5.0	6.0
Nickel, per cent	...	...	1.0
Iron, per cent	...	...	0.30
Phosphorus, per cent	...	...	0.05

* In determining compliance with minimum copper, copper may be computed as copper plus nickel, to nickel limit prescribed.

[1] A day's melt shall mean a normal day, one shift, not to exceed 10-hr over-all melting period. When two or more shifts are used each shift shall be considered the equivalent of a day's melt.

Table II—Tensile Requirements

Tensile strength, min., psi	30000
Yield strength, min., psi*	14000
Elongation in 2 in., min., per cent	20

* Yield strength shall be determined as the stress producing an elongation under load of 0.5 per cent, that is, 0.01 in. in a gage length of 2 in.

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Only the JOY WG-9, in its class, offers replaceable crosshead guides and cylinder liners, and full force-feed lubrication—features that will save you money in operating and maintenance costs. Unique truncated pistons and angled over-size "Dual-Cushion" valves assure higher valve capacity, better heat dissipation, lower air friction and elimination of valve pounding.

The WG-9 is a water cooled, double acting, single stage, heavy duty compressor for use where medium amounts of air are needed or for supplementary service in high air-requirement industries. Vertical design minimizes vibration and cuts required floor space. Foundation is but a simple concrete pad.

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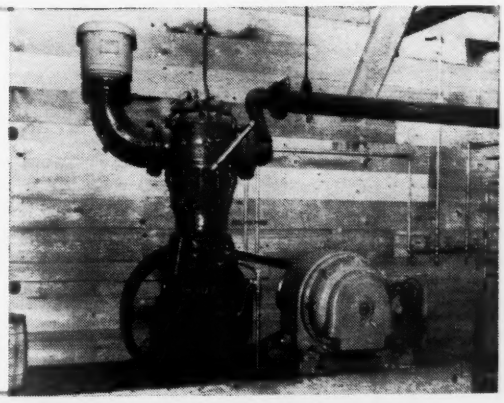

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GOOD CASTING DESIGN

Can Help Foundry Operations

By J. W. BRYANT

ONE OF the most important factors in the bronze foundryman's attempts to produce large quantities of castings under emergency conditions, is the design. This does not refer to the design as it relates to the mechanical function of a given unit. That is the engineer's job, and the engineering fraternity is quite competent to handle it.

The mechanical designer is faced with two tough problems in developing mechanisms that go into or on navy ships. Each unit must fit into a minimum of space, and the weight must be held to a minimum. Major items in building a unit include pumps, motors, valves, pipes, tubing, gears, bolts, nuts, gaskets and many others. Weights and dimensions are determined by anticipated service performance. Therefore, it is an accepted fact that all saving in weight and overall dimensions are attained by economizing on the weight and size of the castings. In many instances the castings are combination housings and oil reservoirs that must withstand a definite pressure test.

Results May Be Tragic

Since the average mechanical engineer is not familiar with foundry problems relating to external and internal shrinkage of bronze alloys, little or no consideration is given to them at the time the original design is made. Results can be and often are tragic. The unfortunate feature is that even when it is necessary to create an unusual design, it may be possible to eliminate or reduce the foundry hazards.

Among the many examples of poorly conceived design encountered in a long and varied career, the author recalls one particular casting—a combination housing and oil tank. A pump and auxiliary items were mounted inside. Considerable oil was circulated to actuate a complicated mechanism on a 5-in. gun, and before acceptance the casting was subjected to a severe pressure test.

This particular experience was at a period considerably in advance of Pearl Harbor, and our plant was small compared with the size attained in later years. In seeking some navy contracts we were given an order for a number of these auxiliary castings for the 5-in. gun. Drawings were supplied by the Ordnance Bureau.

The casting weighed 157 lb and had a wall thickness of 5/16-in. A preliminary examination of the drawing from a foundry standpoint showed several design features that definitely indicated potential trouble. A request for certain changes in the design was promptly turned down in a reply that claimed the castings formerly had been made according to the original design in one of the navy yard foundries. Some time later we discovered that the statement was true, but did not quite coincide with the legal phrase, "the truth, the whole truth, and nothing but the truth." Two good castings had been made during a 6-week period. Our contract called for delivery of 25 castings per day.

Down to the present day the harrowing experience of trying to make an improperly designed casting is not on the list of life's most pleasant memories. We worked day and night, Sundays and holidays—with a scrap loss of approximately 50 per cent every day.

About a year later we contracted to furnish complete 5-in. guns. On this basis we were listed as prime contractors. In this position we could submit our own drawings for approval. Elimination of a few sharp corners and two heavy sections and a little streamlining here and there, involving about two hours' work on the drawing table, chased all the bugs out of this casting. We made over 5000.

It is common practice among naval designers to combine in a single unit three or four items which, under normal or ordinary conditions, would be produced as individual castings. The object, of course, is to keep down the weight and bulk. Generally a combination of this character will show considerable variation in size, shape and wall thickness. A little blending in and streamlining can bring the combination casting within the range of practical achievement if proper consideration is given to the foundry problems involved.

As prime contractors, and therefore designers, the firm established a standing rule that no drawing was to be submitted to the Ordnance Bureau until it had been checked by the foundry department with a view toward reducing or eliminating possible foundry hazards. In the great majority of cases potential hazards were anticipated and prevented.

Unfortunately, many if not the majority, of naval casting equipment designers do not attempt to avail themselves of the advice or assistance of competent foundry consultants. Orders for castings generally go to a jobbing foundry. Attempts to make castings from a design that outrages the natural laws of contraction and shrinkage lead to extensive correspondence, personal visits, charges and countercharges, a general loss to both contracting parties, and a definite "never again" resolution on both sides.

Examine All Designs

If I might offer a suggestion, it is that a group of at least five practical and competent foundrymen be set up to examine all designs, point out faults and offer advice on design improvement. Their only consideration would be to anticipate and eliminate design factors that adversely effect the production of satisfactory castings.

Many men in the foundry industry have the practical experience that would enable them to recognize potential causes of trouble. It would be comparatively simple to submit drawings of proposed castings to the group for suggestions, criticism and advice. The same group could check on the alloy to be used in the production of the casting. In many instances the selection of an alloy is left to the judgment of a young engineer whose knowledge of alloys is indicated by the fact that he is not quite sure whether the word is spelled with one L or two. In his selection of an alloy he is guided by a book on navy specifications. His selection is based on the physical values and with no consideration as to whether its casting characteristics are suitable for the production of good castings. Navy *G* frequently is specified for castings that are better in every respect when made from the Navy *M* alloy.

Rules governing test bars and chemical analysis also could be clari-

(Concluded on page 226)

Anyway you look at it...

SAND CONTROL pays for itself

It's simpler than you think

Modern foundry methods with close sand control are simple enough—even for the smaller foundries. These four units of Gordon-Campbell sand-testing equipment will serve to show that sand testing doesn't have to be drawn-out, complicated procedures.

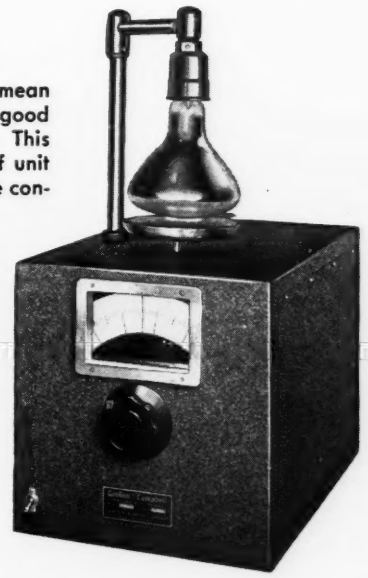
Guess methods of judging sand conditions are costly in scrap alone—cost more in a short time than will pay for real sand control. Look into Gordon-Campbell sand-testing equipment. You can turn a large percentage of your scrap into profits—and get better castings.

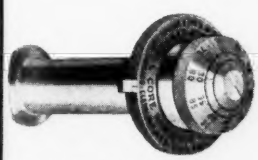
Gordon-Campbell
Combination RAMMER-COMPRESSION TESTER

Correct bond strength is vital to the production of good castings. This simple unit combines ramming of specimens for permeability tests and the testing of bond strength. Strength values are read direct on dial.

Gordon-Campbell
MOISTURE TESTER

Close moisture control can mean the difference between good castings and "scrap". This simple, accurate, foolproof unit quickly determines moisture content of sand.





Gordon-Campbell
CORE HARDNESS TESTER

Why gamble with cores of uncertain hardness? This simple tester shows positive hardness values in a few minutes.

Gordon-Campbell
PERMTESTER

To avoid the defects caused by poor venting of molds and cores the Permtester is essential to determine the permeability of molding and core sand mixtures. Permeability values are shown on direct-reading dial in a few minutes—no calculations.

Other Gordon Campbell SAND-TESTING UNITS

TRANSVERSE TEST CORE MAKER for preparing core specimen for transverse tests.

TRANSVERSE CORE TESTER Quickly determines transverse strength of cores.

CORE BAKING OVEN Electrically bakes core specimens.

SAND WASHER The easy-to-use method to determine clay content of sand.

The Gordon-Campbell sand-testing units are made to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

Free to any foundry man

A booklet that takes the mystery out of foundry sand testing and control. Write for this simple discussion on common foundry-sand troubles and how to get away from them.

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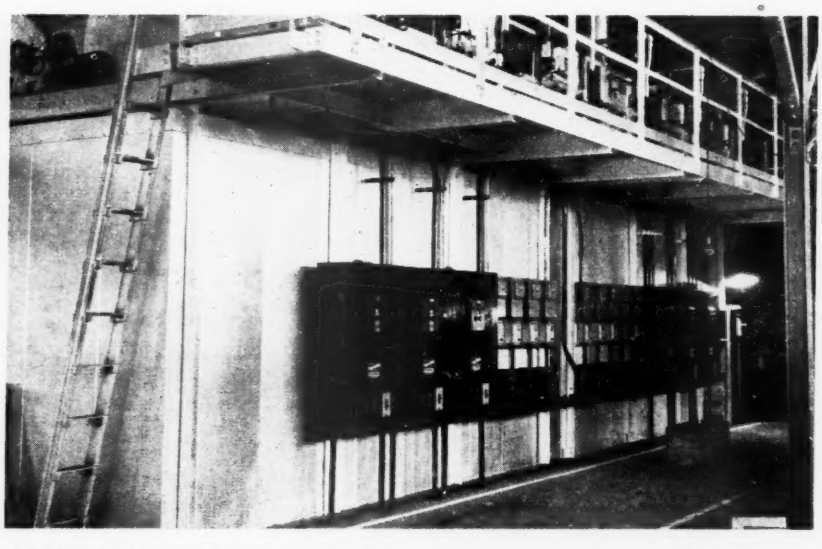
(*Concluded from page 224*)

fied, simplified and improved by the five-man group referred to previously. Present regulations as carried in most of the individual specifications require a test bar and analysis of each heat, even if it amounts to only 250 lb. In present-day foundry practice, where practically all castings are made from ingot metal of known analysis, this specification obviously is ridiculous.

Chemical analysis of a given lot of ingot metal should be checked by the navy at the smelter. The ingots of an approved lot might be marked with an identifying letter *H, M, G.*, etc., and, of course, stamped with the navy emblem, the anchor. From that stage on analysis checks and test bars should be limited to the minimum number required to check on the foundry melting practice. This is particularly true of castings where ultimate tensile strength, elongation, etc., are not the prime requisites. A composition *G* test bar that has pulled 30 per cent in excess of minimum requirements, means absolutely nothing if the casting it represents leaks through external or internal cracks, shrinkage or segregation.

The foregoing to some extent wil indicate what the writer has in min The general idea is to urge that th foundry should be given some con sideration, that the rules and regu lations should be adjusted to moder conditions, and that they be clearl stated so that interpretation will no be left to inspection offices and of ficers.



CORE BAKING CONTROL: A 20 per cent reduction in core baking time is reported by the foundry of a large machinery builder through close control over oven temperature. This regulation permits continuous operation at the top temperature limit without danger of burning the cores. Each of the foundry's six gas-fired Coleman ovens shown above is controlled by a Leeds & Northrup Electromax controller. Temperature control is applied to the fuel valves, located on top of the ovens next to the external combustion chamber. In the view below an operator is shown setting the control point on one of the controllers. At extreme right is a multiple-point instrument which records temperatures of individual ovens. This record affords a ready check on control performance

Book Review

The Welding of Nonferrous Metals By E. G. West; 553 pages 5½ x 8¼ in.; including 24 pages of reference and an index; published by John Wiley & Sons Inc., 440 Fourth Ave New York 16; price $8.50.

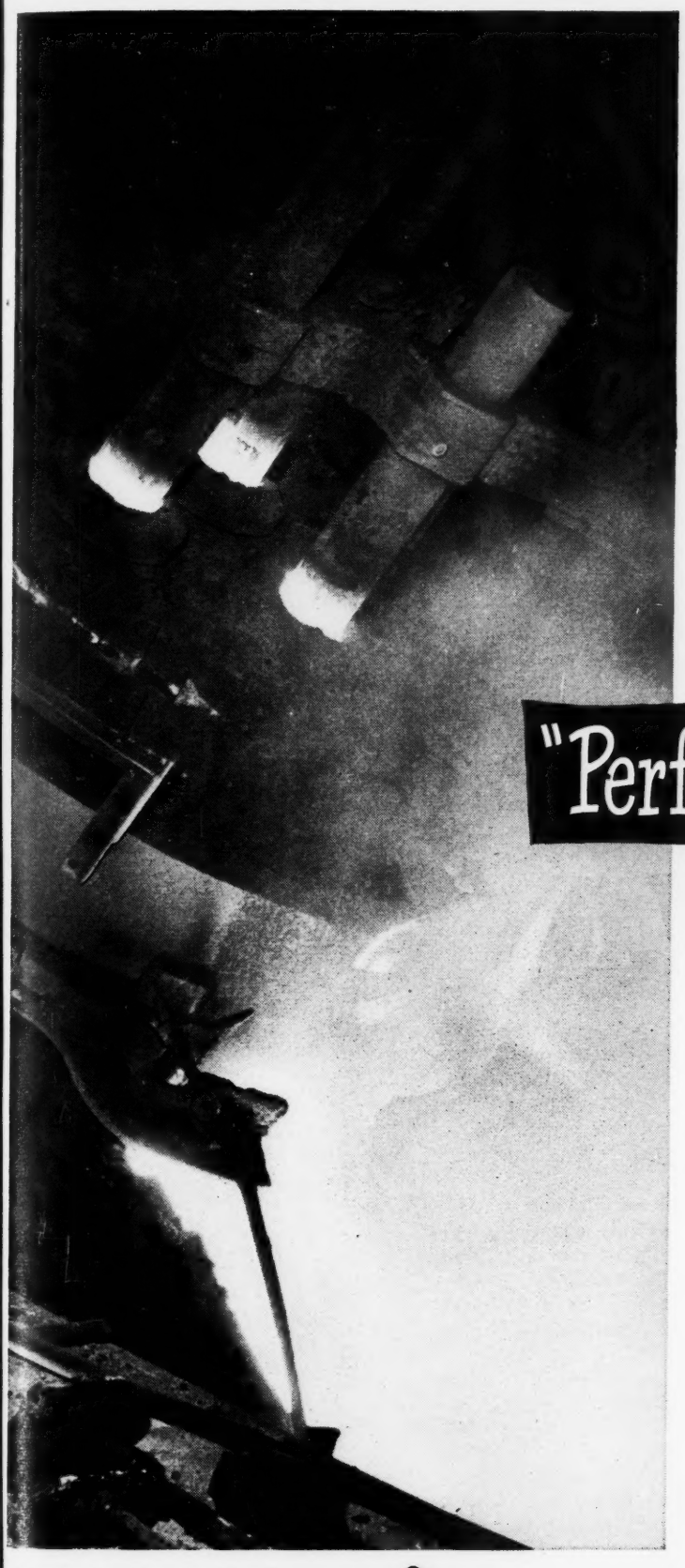
The author is technical director the Aluminum Development Associ ation, formerly senior investigator British Nonferrous Metals Researc Association. In a foreword Leslie Aitchison points out that despite the impression received from a first glance through the book that it is concerned almost entirely with *how* the book in reality is permeated with *why*.

In the preface the author explains that the book has been written with two main classes of readers in view: The welding engineer, welding operator, welding instructor and trainee on the one hand; and the designer works engineer and metallurgist on the other. In any event the welding expert must gain real knowledge by actual welding experience. Descriptions of the processes and equipment are presented in sufficient detail for the new or non-welder to understand the influence of the properties of the material on the modification of the necessary process.

Chapter headings include: Weldability, Properties Important in Welding, Summary of Fusion Welding Process, Resistance Welding Process, Pressure Welding, Welding of Aluminum and Its Alloys, Welding of Magnesium Alloys, Welding of Copper and Its Alloys, Welding of Nickel and its Alloys, Welding of Lead and Its Alloys, Welding of Zinc and Its Alloys, Welding of Low Melting Point Metals, Welding of High Melting Point Metals, Welding of Precious Metals.

Anniversary Booklet

In commemoration of its fiftieth anniversary United States Gypsum Co., 300 West Adams St., Chicago 6, has published a handsomely illustrated booklet, "Building a Better Tomorrow," containing information about the firm, including the various developments which contributed to its growth and progress.



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and making money for steel producers...

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"Performance-Proved" Electrodes

What do we mean "performance-proved?" Just this: I.G.E. Electrodes are tested through actual performance in electric furnaces. I.G.E.engineers analyze their characteristics . . . study them from every aspect during operation.

As a result, I.G.E. Electrodes save money for users by producing higher tonnages and lasting longer. They also possess these important physical features:

- **Uniform structure of controlled densities**
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Coupled with this I.G.E. quality is I.G.E. technical service. The I.G.E. service man . . . with a broad background in all phases of furnace operation . . . is ready to help with *your* electrode problems.

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OPEN HEARTH COMMITTEE MEETS

In 35th Annual Conference

By EDWIN BREMER
Metallurgical Editor
FOUNDRY

ATTENDANCE at the 35th annual conference of the National Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers, held at the William Penn Hotel, Pittsburgh, Mar. 31 to Apr. 2 hit a record mark of 1250.

In a session on operating metallurgy, with J. S. Marsh, Bethlehem Steel Co., Bethlehem, Pa., and C. R. Taylor, Armco Steel Corp., Middletown, O., as chairmen, D. L. McBride, Metallurgical Advisory Board, Washington, pointed out that, since all high-grade ores used in making ferromanganese are imported, the latter should be conserved as much as possible. Hence, in the open hearth such materials as silicomanganese or low-grade domestic manganese ores should be used.

C. C. Brown, Inland Steel Co., East Chicago, Ind., discussed the use of exothermic chromium, and manganese alloys. When added in the ladle they show good recovery and provide a gain in silicon as well as the major alloy, in addition to improved temperature control. With rimmed steel increase of silicon has an adverse effect.

F. W. Boulger, Battelle Memorial Institute, Columbus, O., presented a brief review prepared in co-operation with R. C. Buehl, Bureau of Mines, Pittsburgh, on methods of recovering manganese from open-hearth slags. High cost makes such operation of value only in emergency.

S. Feigenbaum, Jones & Laughlin Steel Corp., Pittsburgh, spoke on use of manganese sulphide in producing resulphurized steels, and said it appears to provide better surface on the ingots compared with straight sulphur additions.

Steel bath temperature measurement was discussed by several speakers, including Ralph Hindson, Steel Co. of Canada, Hamilton, Ont.; D. J. Carney, U. S. Steel Co., Chicago; Oscar Pearson, U. S. Steel Co., Gary, Ind., and J. R. Brady, Wisconsin Steel Co., Chicago. Consensus was that use of such instrumentation permits tapping at uniform temperatures consistently, and the temperatures usually are lower than when measurements are not used. Lower temperature in turn reduces stickers and cracking of ingot molds.

Michael Tenenbaum, Inland Steel Co., East Chicago, Ind., in discussing significance of the furnace block, pointed out that essentially it is employed to control carbon drop. While the furnace block could be omitted under favorable conditions with extremely rapid carbon analysis, some unexpected delay would necessitate its use, hence the practice of furnace block is generally insurance against possible trouble.

In a session on cold metal and basic foundry practice under the direction of C. M. Kay, American Steel & Wire Co., Worcester, Mass., and W. A. Peters, Laclede Steel Co., Alton, Ill., slag control with use of burnt lime was described by W. H. Steinheider, Sheffield Steel Co., Kansas City, Mo.

A. H. Sommer, Keystone Steel & Wire Co., Peoria, Ill., and A. Bigar Jr., Lukens Steel Co., Coatesville, Pa., spoke on use of oxygen, and pointed out that conservative application results in speedier meltdown of scrap, and beginning of slag action. It also increases steel production by about ½-ton per hr. A. R. Edwards, Keystone Steel & Wire Co., said that when over 40 per cent cold pig iron is used in the charge the time required for the heat is increased although charging time is decreased.

Reduce Sand Penetration

Frank Hohn Jr., Scullin Steel Co., St. Louis, described the use of bath pyrometry in eliminating trouble from sand penetration in producing car side frames. By control of bath temperature, penetration is held to a minimum.

Albert Calderon, Industrial Automation Inc., Detroit, spoke on a new method of charging open-hearth furnaces which he developed. System includes installation of a high platform along one wall of the furnace building on which the scrap is held. From there it is placed in special charging machines equipped with large duplex hoppers and extensible peels. Charging machine requires open-front furnace without center buckstays, and 9-ft doors. Speaker claimed a saving of $2.50 per ton in charging, and a charging time of 25 to 30 minutes.

L. R. Berner, Inland Steel Co., East Chicago, Ind., and H. E. Warren Jr., U. S. Steel Co., Morrisville, Pa., presided at a session on training open hearth personnel. Speakers on the subject included L. G. Ekholm, U. S. Steel Co., Duquesne, Pa.; M. F. Yarotsky, U. S. Steel Co., Chicago; C. W. Conn, Ford Motor Co., Dearborn, Mich.; E. E. McGinley, U. S. Steel Co., Youngstown, O.; H. L. Tear, Jones & Laughlin Steel Corp., Pittsburgh, and A. H. Osborne, Armco Steel Corp., Middletown, O.

Mr. Ekholm presented the initial one of a series of proposed sound-slide films which was underwritten by the National Open Hearth Committee to indicate what might be accomplished along that line. The other speakers described training procedures in their own plants which included use of manuals describing all operations from construction of the furnace to pouring the ingots, holding of classroom or discussion groups, etc.

Cast Malleable Terms Of Sale Revised

Malleable Founders' Society has published newly revised "Terms and Conditions of Sale for the Malleable Castings Industry." Work of preparing these revised terms of sale was handled by a special society committee headed by Frank O. Parker, vice president, Dayton Malleable Iron Co., Dayton, O.

These terms of sale have been approved by the society, and on Mar. 3, 1952, were approved by the National Association of Purchasing Agents. Copies may be obtained from the offices of the Malleable Founders' Society, Union Commerce Building, Cleveland 14.

The new terms of sale follow:

All quotations are made and all castings are sold upon the following terms and conditions:

A. General Conditions

1. Unless otherwise agreed, quotations must be accepted and patterns furnished to the foundry within thirty (30) days from the date of quotation.

2. Unless otherwise specified by the foundry, quotations are based on castings with gates, fins and other projections removed to approximately the contour of the pattern. All castings are sold as unmachined castings, usually with heads, gates, fins and similar extraneous metal removed, f.o.b. cars, foundry point. Terms—thirty (30) days net, from invoice date, unless otherwise stated.

3. Claims for error in weight or number must be made within ten (10) days after receipt of castings.

4. Castings found to be defective shall be reported promptly to the foundry. If the defects are found to be due to faulty workmanship, the castings may be returned for credit at the invoice price within 90 days from the date of shipment. The foundry will not be responsible for machine work, labor charges or other expenses incurred in connection with castings which have been rejected unless otherwise agreed in writing.

5. Repairs and changes to patterns, including the cost of replacing patterns, will be made at the expense of the customer.

6. All freight, drayage, boxing and crating charges on patterns, both to and from the foundry, shall be assumed by the customer.

7. The foundry shall not be liable in any manner for loss or damage by reason of the manufacture and sale of any patented device or parts thereof made in accordance with drawings, designs, models or patterns furnished by the customer.

8. When the foundry submits a sample casting for approval and the customer approves

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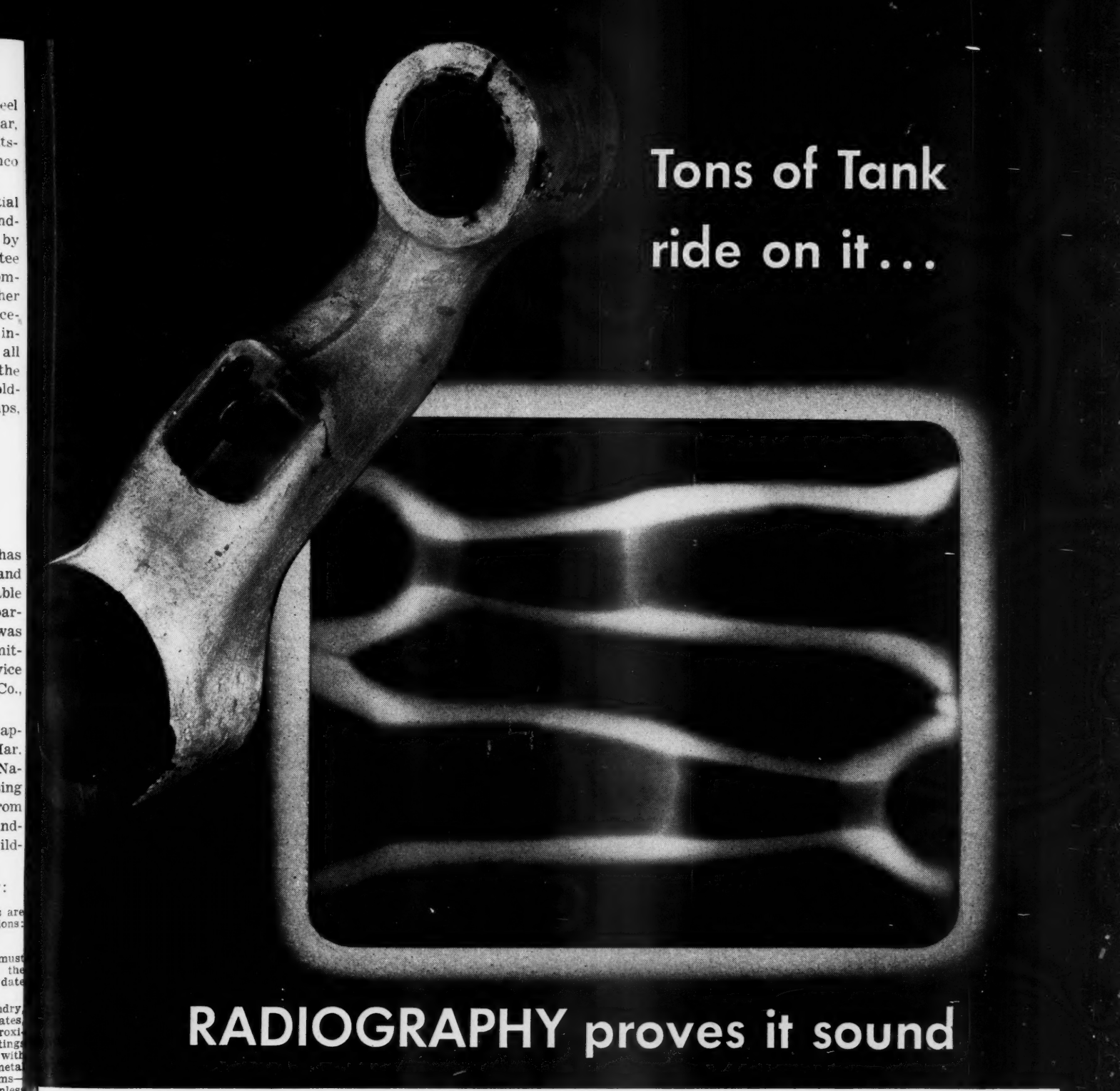


RADIOGRAPHY proves it sound

It's the arm that carries the rear caterpillar track wheel of a tank. Failure would mean complete disablement—so soundness in the casting is a "must."

To make sure, the casting is radiographed. It's the one way to learn internal conditions without destroying the part.

Cases like this show why radiography is becoming routine in foundries everywhere. It helps earn a reputation for constant top-quality work—frequently suggests changes in operations that bring higher yields in production runs.

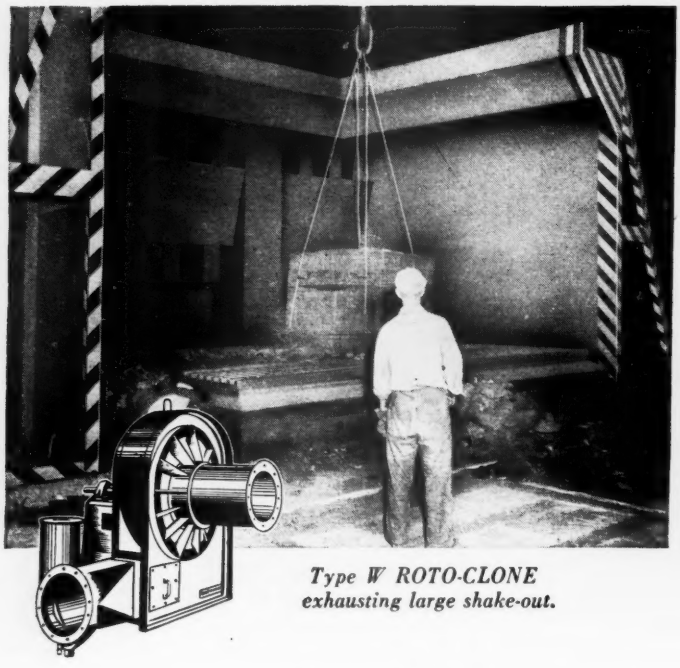
Your x-ray dealer will be glad to discuss ways radiography can increase your production. Get in touch with him. Also send for a free copy of "Radiography As A Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

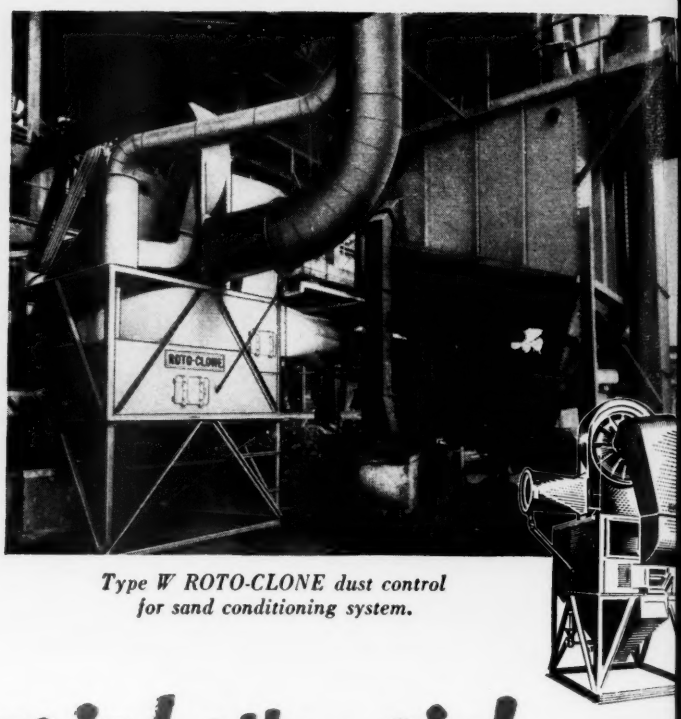
Radiography...

another important function of photography

Kodak
TRADE-MARK



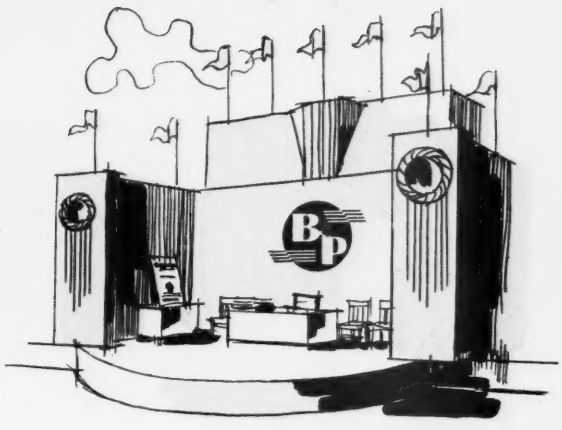
Type W ROTO-CLONE exhausting large shake-out.



Type W ROTO-CLONE dust control for sand conditioning system.

today's best buy is better air!

Type D ROTO-CLONE applied to Swing Frame Grinding.



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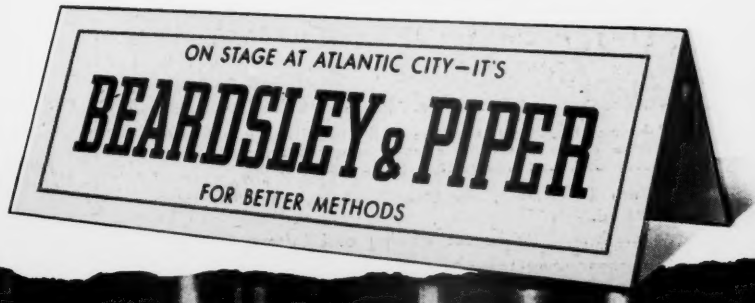
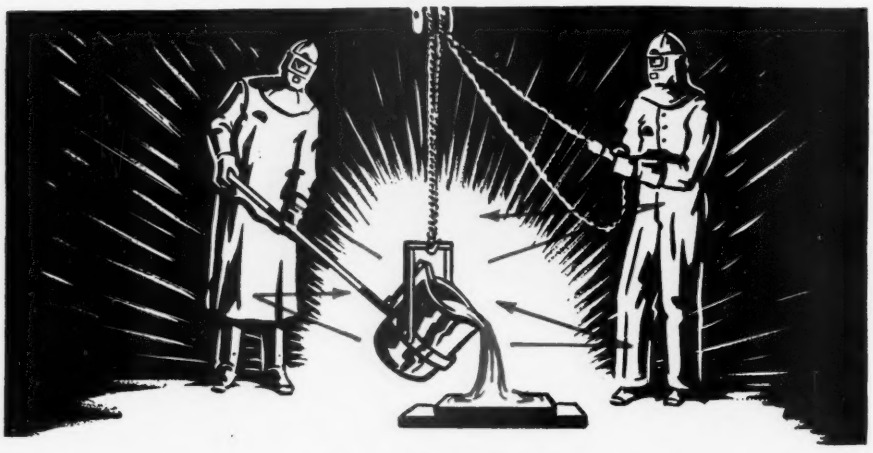
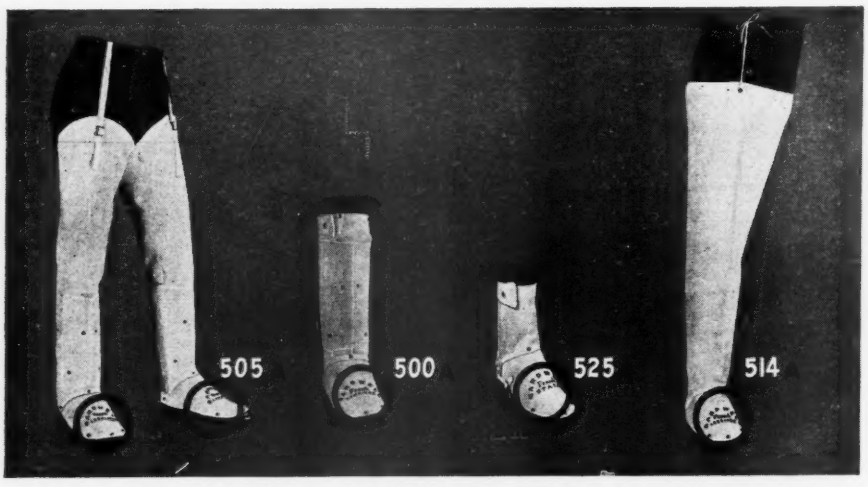


LOOK FOR THE GARDWELL Products TRADEMARK



ALUMINIZED GARDWELL CLOTHING PROTECTS AGAINST HEAT HAZARDS—REFLECTS 90% OF RADIATED HEAT

GARDWELL Aluminized Clothing is almost in the "Miracle" class. In foundries, steel mills, forging plants, heat treating shops, etc. —in fact, any place where there is radiated heat—GARDWELL Aluminized fireproofed duck or Aluminized Underwriters Grade Asbestos protective garments, gloves and mittens offer protection not heretofore available. The heat is 90% reflected. The worker's body remains at normal temperature in spite of the great heat just a few feet away. Protection is also afforded against metal splash.



The line of GARDWELL "FRANK" Aluminized Leggings is complete as illustrated above with styles and sizes for every purpose. In addition to the aluminized numbers all styles are made in the usual leather, fireproofed duck and Underwriters grade asbestos.

With over 27 years of experience in manufacturing Safety Clothing and Equipment you can be sure that any product with the GARDWELL Trademark is highest quality.
Write for catalog and information.

Safety CLOTHING AND EQUIPMENT Co.
1990 EAST 69TH STREET · CLEVELAND 3, OHIO
PHONE HENDERSON 2-0400

(*Concluded from page* 228)

the sample, then castings which are commercially like the sample shall not be considered defective because of a variation from blue print dimensions.

9. When bags, barrels, boxes, pallets or other containers are needed for shipping castings, the customer shall bear the cost thereof. The customer shall pay the return freight on any shipping equipment, such as pallets, the return of which is acceptable to the seller.

10. The foundry will not be responsible for loss of or damage to patterns as a result of fire or other casualty beyond its control.

11. The foundry shall not be liable in damages for failure to deliver as a result of fire, strikes, differences with employees, accidents or other causes beyond its control.

B. Quotations

12. Blueprints submitted for estimating purposes should be marked with unfinished casting weight, if known, or an estimated weight of unfinished weight upon which quotation will be based. A detailed description of the pattern equipment should be furnished.

13. When quotations involve the making of piece prices, definite weights shall be established and agreed upon, and quotations shall be subject to revision on any variation from the established weights.

C. Orders

14. No order shall be changed unless such change is agreed to in writing before work is in process. If work is in process, the customer will be charged for any castings made, cost of cores, molds or equipment discarded because of such changes.

15. Cancellations of orders are to be made only by mutual consent of the buyer and the seller.

16. Unless otherwise stipulated, the customer shall accept an over-run or under-run of 10 per cent of quantities specified on an order. However, the foundry is to make an effort at all times to furnish as nearly the correct quantity specified as operating conditions will permit.

17. If the customer requires special production service or unusual deliveries, an extra charge shall be made.

D. Pattern and Corebox Equipment

18. The customer must supply pattern and corebox equipment in condition to produce the quality and quantity of castings required in an economical and efficient manner.

19. The foundry will not be responsible for variations existing between blue prints and pattern and corebox equipment supplied by customer. If requested to do so by the customer, the foundry will check patterns and corebox equipment with blueprints at customer's expense.

20. All patterns, coreboxes and loose pieces thereof, should be marked properly for identification.

21. Follow boards, core driers and similar devices, when required, are to be furnished at customer's expense.

22. Pattern storage facilities are provided by foundry for active patterns only. Patterns not in use for a period of twelve (12) months will be returned to the owner or will be subject to storage charges.

NPA Procurement Manual

Revised edition of the "Government Procurement Manual" has been announced by the Department of Commerce as the only source of information in the federal government covering procurement activities of all major military and civilian agencies. Listing 5000 items and classes of items for which federal agencies have requirements, it contains a military agency and civilian agency index together with listing of procurement office locations. Manual was compiled by the Office of Small Business in the department's National Production Authority, and is available through Department of Commerce field offices.

Why U. S. Rubber grinding wheels are the choice of steel foundrymen!

Small photo at top shows worker grinding large "T" used in refineries. Large photo shows worker smoothing casting of elbow.

A foundry in Georgia, casting steel pipe fittings, removes gates and flash, grinds openings and bolt holes—using U.S. Royalite® Grinding Wheels exclusively. Why? Because they have proven to be the most efficient and economical. They are fast-cutting and remain cool in operation.

Over 89 years of experience with bonds and abrasives enable United States Rubber Company to lick most any grinding wheel problem you may have. Write to address below.

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Don't Overlook the
IMPORTANCE OF CORE DRIERS

By WALTER A. WHITE

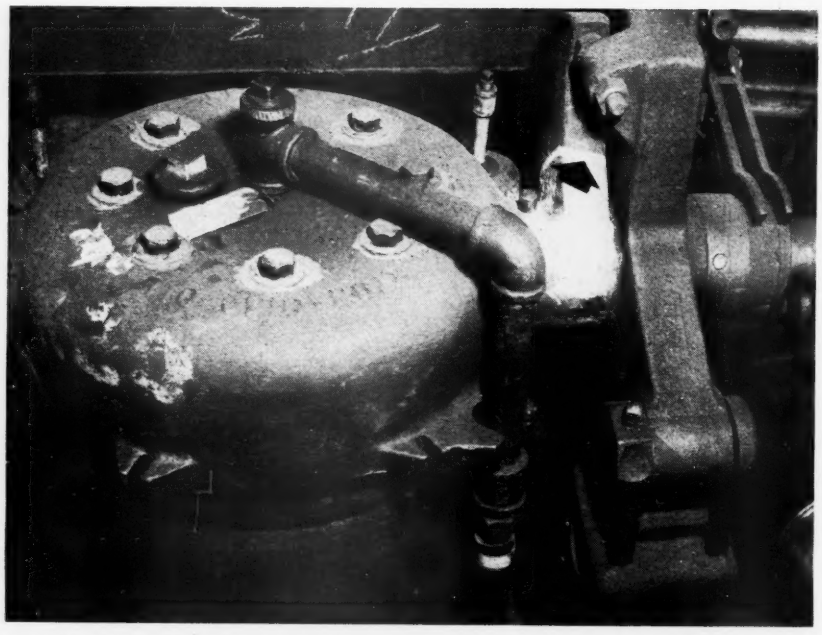
THE importance of core driers and the part they play in the modern mass-production foundry is often overlooked. Any coreroom operator can discuss the importance of particular cores, the type of sand, the contents, the treatment of bonds of various kinds, and the percentage of scrap; but seldom can he ascribe the percentage of scrap to a given reason correctly. Often the trouble is blamed on the drier equipment and for this reason alone, driers should have closer study.

Many factors must be considered in manufacturing core driers; these factors include type of metal used in drier construction, number required, oven heat, design, speed of manufacture and cost.

All the groups are interdependent, as can be seen from a close study of the list. The type of metal used for driers is dependent partly on the core baking temperature. The maintenance question is bound closely to the type of metal used, for where large numbers of driers are required for certain cores containing a high percentage of linseed oil in the sand, the cleaning of these driers is a problem if they are made of aluminum. If they are made of gray iron, a caustic solution of soda and a tank of hot water solves the problem speedily and cheaply.

There is much to be said for cast-iron in the manufacture of driers—ease of manufacture, simplicity in cleaning, low overhead cost, speed of replacement. However, a disadvantage is a high breakage rate with careless handling. In addition, where weight must be considered, aluminum often is preferred, especially where cores have a plane surface and can be turned out on a plate-type drier. The cleaning of plates does not require the same treatment as do the more intricate driers and care must be taken to see that where two types of metal are used, such as cast-iron for pipe cores and aluminum for plate jobs, the plates are not subject to the same cleaning as the cast iron. Aluminum and caustic soda are not friendly and mixing the two will not cut costs.

The design of core driers should receive more care than is usually given it. Although the design naturally must follow the inside pattern of the top half of the corebox, consultation with the core shop is important if the maximum efficiency is to be obtained from the driers. For instance, designing driers with sharp protruding ribs unable to slide over oven bars, or not calculating the width of ovens when considering plates so that where two plates are used side by side with some waste space, a close study may fit three plates on a shelf.



QUICK REPAIR: When the Olney Foundry Division of Link-Belt Co., Philadelphia, recently was faced with a broken arm on a rollover machine cylinder head, it was able to return the unit to operation in about two hours' welding time, at a total cost of approximately $15. Employing materials and technique developed by the Eutectic Welding Alloys Corp., the broken cast iron sections were prepared for welding and beveled to form a double vee. This was accomplished by use of an oxygenless chamfering electrode. The sections then were clamped in position and a flux applied to the weld area to exclude oxides in the weld zone. The flux also is a temperature indicator, liquefying under the subsequently applied oxyacetylene flame at the correct bonding temperature of the base metal. At this point the filler metal was applied, using the "bead-forming" technique. The arrow above points to the completed weld. The work required 4 pounds of alloy rod

Make One Trial Casting

Much of the time spent fitting driers to the master jig or dummy can be saved if, where large numbers are required and are made from a metal pattern on a molding machine, the patterns are worked to the closest possible limits. Even if the patternshop inspector passes the drier pattern for production he should not do this until at least one trial casting is made.

Where machining facilities are available, driers should be designed to be machined wherever possible. The use of multigang cutters for pin cores is a good example. In short, the same care and attention that is paid to master jigs, dummies and production patterns, should be given to the drier pattern, for all time and material charged to core driers is a direct charge to coreroom costs—or should be. The system used in many plants is that all jigs, fixtures and patterns for the making, checking and fitting of driers are made in the metal division of the patternshop, inspected by the shop inspector, and then passed over to the drier section, which then takes sole responsibility for pattern jigs drawing, the ordering of supplies for the coreroom, the supply of driers and their mainte-

(*Concluded on page* 238)

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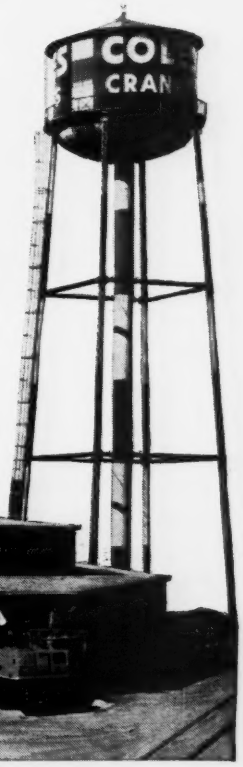

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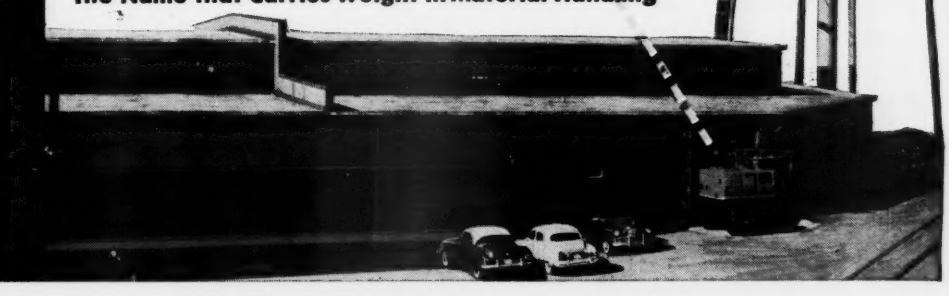

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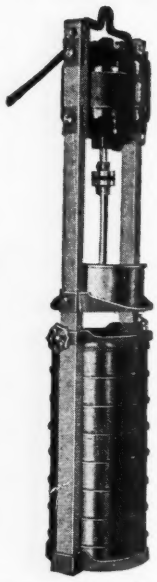

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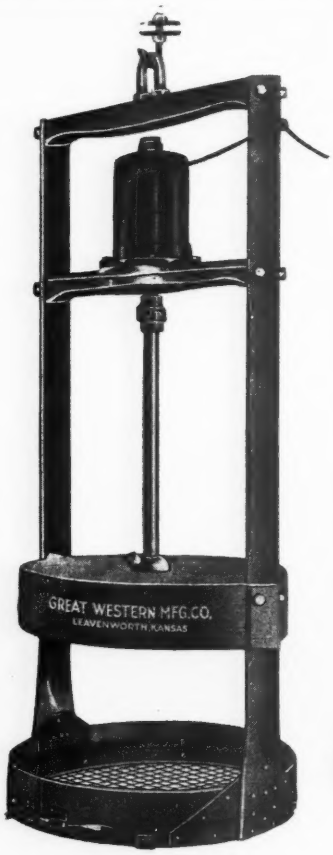

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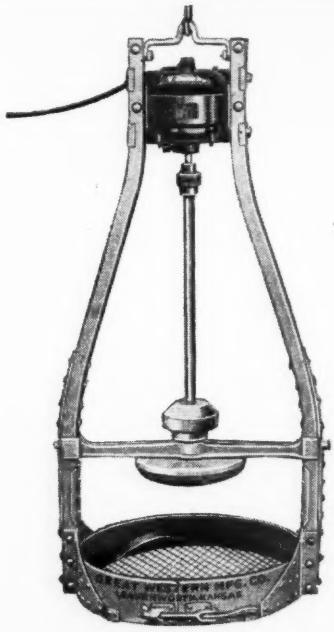

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(*Concluded from page* 236)

nance until the job is obsoleted.

The system of making the drier section part of the pattern shop has many advantages. It enables the superintendent of pattern shop to keep a close check on core equipment, which comes under his control. It also allows the pattern shop, through the drier section, to keep a tight watch on core faults that might otherwise be blamed on corebox troubles.

Fitting driers to a master jig and making them available for room use can be carried out by semiskilled labor; although the making of jigs and fixtures should be allotted to trained personnel. Therefore, the ideal drier section should contain, in addition to supervision, at least one skilled man able to carry out any small repairs or alterations to equipment when required.

A competent drier section should have the responsibility of all work in connection with driers, and, after the initial design is satisfactory, be able to carry out all work necessary to the job.

The fitting of driers should present no problems. The usual rules for fitting apply, and as long as the section is equipped with modern tools and the supervision is adequate, the main job of the drier section is to keep the coreroom happy. And the only way to keep any core shop personnel happy is to give them all they ask for, at least two days before they ask for it.

Steel Reference Charts

Revised reference charts—dated, January, 1952—covering carbon, alloy and stainless steel casting materials have been issued by the Lebanon Steel Foundry, Lebanon, Pa. These reference charts give specification designations, analyses, physical properties and heat treatments for the company's casting materials. One chart includes stainless corrosion and heat resistant alloys, the other carbon and low alloys. Either or both charts will be sent upon request to Dept. N, Lebanon Steel Foundry, Lebanon, Pennsylvania.

Opens New Office

Dravo Corp., heating department, Pittsburgh, has opened a new office in St. Louis at 1110 South Brentwood Blvd. It will be in charge of Fred W. Schulte, sales engineer, who will handle the firm's counterflow heaters and crane cab coolers. Mr. Schulte was graduated from Washington University with a degree in mechanical engineering.

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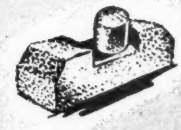

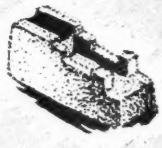

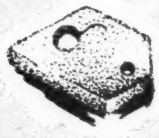

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ASTM Helps in Scarce Material Conservation

As an aid to the Office of Defense Mobilization in carrying out its objectives, the American Society for Testing Materials has been requested to develop methods of conservation of scarce materials, through the use of substitute materials or through more efficient use of materials. By formal contact these services will be rendered to the recently appointed consultant to the Director of Defense Mobilization on Conservation of Materials, John R. Townsend of the Bell Telephone Laboratories. Individual projects will be undertaken at the request of the consultant and reports will be furnished to him.

To carry out this work the society has employed a staff engineer, Howard S. Phelps, who recently retired as engineer in charge of the testing division, engineering department, Philadelphia Electric Co. The services of present ASTM staff personnel and facilities of the society, together with the overhead expense incident to the project will be contributed by the society; salary and traveling expenses of Mr. Phelps and of supporting stenographic and clerical staff will be paid by ODM.

Will Assemble Information

Mr. Phelps will be available at all times to the ODM Consultant on Conservation of Materials for the assignment of problems, assembling of information and similar activities relating to the project. The executive secretary of the society, C. L. Warwick, will have general administrative supervision for the society.

Among the services to be rendered under this contract are collection and organization of factual knowledge and reliable opinion dealing with the conservation of materials by using the extensive facilities available to the society, notably through its technical committees. Development of emergency and substitute ASTM tests and specifications will also further the cause of conservation. The society will also use its facilities to inform its members concerning needs for conserving critical materials and various ways in which such conservation may be accomplished in a useful and practical manner.

The first project to be undertaken concerns the conservation of nickel. A conference of appropriate ASTM committee officers and representatives of various interested industries was held at Society Headquarters in Philadelphia on Tuesday, Mar. 11. An account of this conference is to be published.

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Effect of Raw Materials on CUPOLA OPERATION

By BERNARD P. MULCAHY
President
Fuel Research Laboratory Inc.
Indianapolis

How different types, shapes and qualities of scrap affect cupola operations is discussed in this second of a series of articles. The first article was presented in March

MANY factors determine the amount and character of the scrap used in a cupola mix. For example, the percentage of "returns" (including sprue) is a function of the type of casting poured as well as the normal shop losses. These returns, therefore, largely set the pattern for the balance of the charge, because obviously they will be used first, making up the balance from the other constituents.

The metal charge consists of pig iron and scrap, and the scrap is further subdivided into purchased cast iron scrap, steel scrap and returns.

Purchased Cast Iron Scrap—The variability of this material is well known and, additionally, it is recognized that many difficulties encountered can actually be assigned to it. To identify the influential characteristics we give below a list of the principal features.

1. Size
2. Character
3. Oxidized iron
4. Burned iron
5. Hard iron
6. Nonferrous content
7. Borings
8. Steel content

Size—We must think of scrap in two different dimensions—volume or bulk, and thickness. To illustrate, motor blocks (stripped) are excellent scrap because of their large surface and contained volume; however, even these can be too bulky for small cupolas and should be partially broken. Contrast this material with solid chunks from heavy machinery and we can readily visualize the difference existing in the ability to absorb heat. Obviously the quantity of each used will also affect the results.

Small material can also adversely affect operations because of denser packing of the charge. Thin, flat material also increases the charge density. Both of these types prevent penetration of the gases for proper heat distribution and force a greater proportion of the heat up along the wall of the cupola.

The effect of too bulky material prevents the proper amount of metal to be charged and reduces the efficiency of the process. Heavy sections in excess prevent proper heat absorption and invariably cause a serious loss in metal temperature. When the charge density goes up because of small or thin material, oxidation of metal and loss of temperature results. In each instance, obviously, the degree of effect is proportionate to the amounts used.

It is not possible to correct completely for the above conditions except by a change in the scrap size, but when such material is used care must be exercised in its distribution. In each instance the prime objective should be to distribute the offending material over a series of charges and avoid a concentration at any particular stage of the heat. For example, heavy-sectioned material should be charged only after the initial fill-up, and several pieces should not be put on successive charges. Fine material can be put on each charge in limited amounts. Large, flat material should be broken up.

Under no circumstances should the length of any material exceed one-third to one-half the diameter of the cupola—that is, in an amount that could cause hang-ups. Hang-ups are too costly (loss of bed) to ever countenance.

Character—By this term we mean the scrap's original source or type, such as farm machinery, auto cast, stove plate, etc. In most instances typical iron is satisfactory, if acceptable from a size standpoint. Stove plate is perfectly good iron but the higher phosphorous content usually attendant with this iron requires careful consideration with respect to the amount used.

The increasing use of certain alloys also indicates the need for caution regarding use of some scrap. In this instance we refer particularly to iron containing appreciable amounts of chromium, molybdenum, etc. used for hardening, or when chill-inducing materials have been used.

In most instances the scrap is so varied in character that it has no particular identity, and for this reason it is all the more insidious. Actually the only proof against undesirable material of the above nature is in a careful inspection as the material is received, unloaded and during charging.

Oxidized Iron — Fortunately this material is generally easily recognized. We are referring here to badly rusted scrap, either purchased as such or recovered from old storage piles. All scrap obviously contains some rusted iron, but we mean iron containing excessive amounts.

The effect of this material can be exerted in several directions. If in sufficient amount it can actually carry through to the molten metal and produce the same effect as iron oxidized in the cupola. It can reduce the desired carbon and silicon, and invariably will cause excessive lining erosion due to extra flux required and higher oxide content of the resultant slag.

When this material must be used do not concentrate on a series of successive charges, but allot in small amounts in order that the effect will be held to a minimum.

Burned Iron—It is necessary to distinguish between oxidized (rusty) iron and burned iron, because of its universally bad influence on cast iron. Its most common form is in grate bars, fire bowls, melting pots, etc. Occasionally it is present in considerable quantity in cars of purchased scrap, but more frequently it is scattered throughout the cars and disregarded.

The poisonous effect of this material lies in the fact that it is oxidized iron in its advanced state, FE_3O_4 and as such is more difficult to reduce or free from its oxygen. No cupola can properly digest this material and no foundries attempting to meet normal specifications should permit its presence in the mix.

We are all familiar with the purpose of the flux in a cupola charge, namely the dissolving or absorption of the ash from the coke, the sand from the returns and the rust on the scrap. The flux scavenges or removes these

(*Concluded on page* 244)

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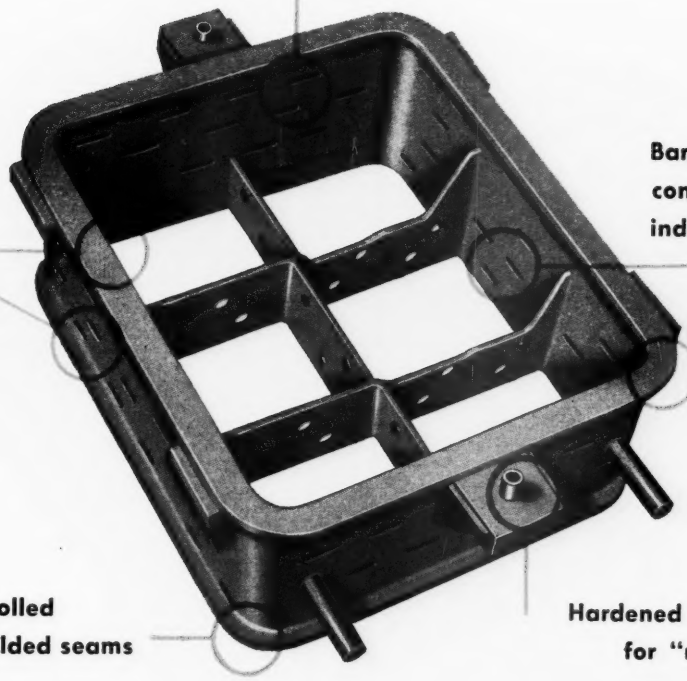

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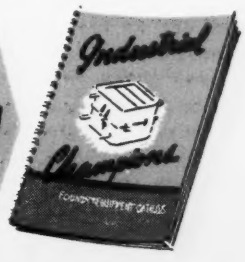

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(*Concluded from page* 242)

undesirable materials from the iron, thereby producing a purer and more dependable product.

We are also familiar with the injurious effect upon the metal when we oxidize in the cupola, either through the use of insufficient coke or too much air. The iron becomes "stiff" and pours poorly, or hard spots develop, or chilled sections show up, all of which result in lost castings and ultimately are referred back to the melting department.

When we allow burned iron to be charged we are asking for trouble because we encourage the above conditions to a greater extent than if we disregarded the control of the cupola.

Depending on the degree of its use burned iron can cause hard spots, misruns and excessive lining erosion. The reason for this is that cupola melting is too fast to convert this high oxide into metallic iron and therefore it remains as such throughout the process. Its solution by the flux is erratic and it quickly destroys fluxing power for the other materials the flux should be dissolving.

When coke is inclined to be of poor quality, thereby making it difficult to maintain good cupola operation, or when pig iron is limited and creates the problem of holding carbons at the desired level, it is imperative that all burned iron be removed from the scrap charged. It is rightfully termed a "poison" to gray iron because of the magnifying effect.

(*To be continued next month*)

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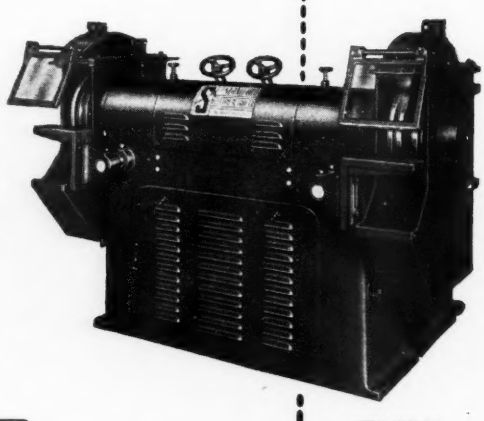

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OBITUARY

HENRY HECHT, 67, president, Alloys & Products Inc., New York, died Mar. 12. Mr. Hecht attended Cooper Union Institute in his youth and in the late 90's joined Hendricks Bros. Inc., a wholesale metal firm dating back to 1769. In 1919 Mr. Hecht organized Alloys & Products, which he headed as president until his death. A pioneer in the manufacture of master alloys and hardeners for the foundry industry, he originated many of the alloys now in common use.

* * *

Robert E. Chapman, 57, general superintendent, American Steel Foundries, Granite City, Ill., died Mar. 11. A native of Vienna, Ill., Mr. Chapman was associated with the company for 30 years and had been superintendent for 10 years.

* * *

C. Ives Waldo, 70, who retired early this year as a salesman in the Chicago office of Pickands, Mather & Co., Cleveland, died Mar. 15, following 35 years with the company.

* * *

George F. Mitchell, 64, president, Peoples Gas Light & Coke Co., Chicago, and president of the American Gas Association, died Mar. 26, following a short illness.

* * *

Charles M. Best, founder of the former Best Foundry Co., New Kensington, Pa., died Mar. 22. Mr. Best's foundry closed about 1914.

* * *

Frank Hamachek Jr., president, Frank Hamachek Machine Co., Kewaunee, Wis., died there Feb. 1.

* * *

D. A. Dalton, president, Dalton Foundries Inc., Warsaw, Ind., died Feb. 15.

* * *

Samuel R. Robinson, prominently identified with the steel casting industry following his graduation from Virginia Polytechnic Institute in 1901, died in Cleveland March 29. For varying periods in a long and active

(*Concluded on page* 246)

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Catalog No. 8 describes iron and steel melting and refining work. For a free copy, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

***Visit the Lectromelt booth #1344 at the International Foundry Congress and Show in Atlantic City, May 1st to 7th.**

*REG. T. M. U. S. PAT. OFF.

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(*Concluded from page 244*)

career he held positions as foundry manager or metallurgist with Duquesne Steel Foundry Co., Coraopolis, Pa.; Massachusetts Steel Casting Co., Everett, Mass.; Philadelphia Roll & Machine Co., Philadelphia; Paper & Textile Machine Co., Sandusky, O.; Industrial Brown Hoist Corp., Bay City, Mich.; Otis Steel Co., Cleveland; Valley Steel Castings Co., Bay City, Mich.; Saginaw Foundries Co., Saginaw, Mich.; Babcock & Wilcox Co., Baberton, O. He was an active committee member of the American Foundrymen's Society and a contributor to FOUNDRY and other technical publications.

Ford Sponsors Industrial Arts Awards

Prizes totaling $45,000 and all all-expense paid trips to Detroit and Dearborn are announced for junior and senior high school students under 21 in Ford Motor Co.'s 1952 Industrial Arts Awards program. Competition is open to students in grades 7 through 12, enrolled in industrial arts classes at any school in the United States. Entries must be regular class projects made in school shops under supervision of instructors.

Projects may be submitted in ten divisions: Wrought metal, pattern-making and molding, machine shop, wood, plastics, electrical, mechanical drawing, architectural drawing, printing and an open division for entries not eligible for the others. Work of national winners will be exhibited at the National Industrial Arts Awards Fair, Chicago Museum of Science and Industry, Aug. 1 to Sept. 14.

Book Review

Treatise on Powder Metallurgy, Vol. III, by Claus G. Goetzel, cloth, 899 pages, 6 x 9 in., published by Interscience Publishers Inc., New York. Price $22.

This volume is divided into two parts—one containing a classified and annotated literature collection, the other a classified and annotated patent bibliography. Organization of both parts conforms closely with the text in Volume I and II to allow quick cross reference or a more comprehensive check of available sources pertaining to the particular subject matter under discussion in the text.

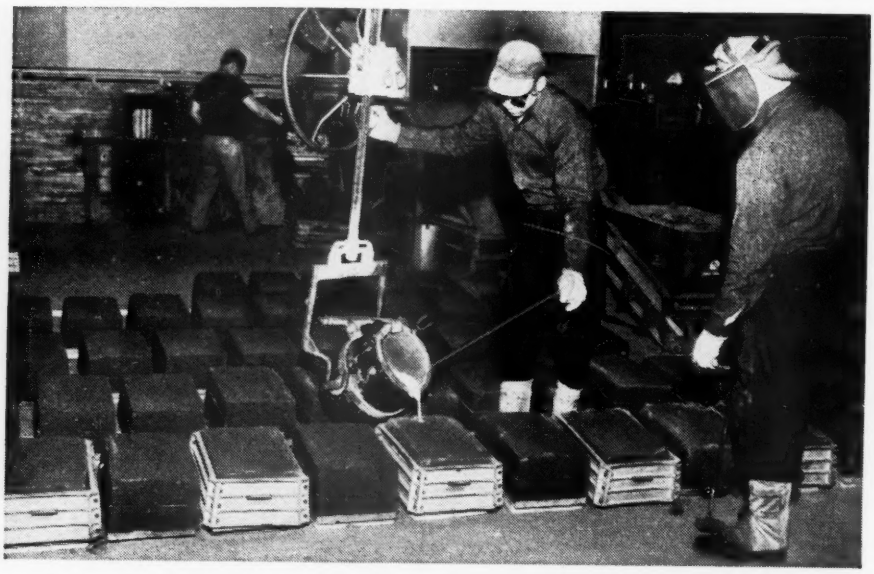
In the first part, references cover the art and science of manufacturing useful articles from metal powders and of producing those powders. Also included are references to pigments, coatings, catalysts, metal powder applications in metallurgical processes and their production as a step in refining or processing of ores. Machinery used in powder metallurgy also is included.

In the patent reference collection the year of issue of the patent is given because it facilitates patent search in the library. In American patent citations, the inventor is given and, where possible, the assignee. In all other countries, the companies owning the patent are named where published at the head of the patent.

Manual on Band Tools

DoAll Co., 254 North Laurel Ave., Des Plaines, Ill., has published a "Band Tool Manual," presenting simplified methods for selecting and operating band tools and machines for sawing, slicing, grinding, filing and polishing all types of materials.

Amply illustrated chapters present band tool terminology, description of the use of different types of blades, explanation of tool performance, how to set up a band tool, and tool selection charts for various types of materials. The manual is priced at $2.



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Foundrymen successfully pouring bronzes should not overlook the advantages of BERYLCO beryllium copper. Here's one metal you don't have to baby.

Molding practice for beryllium is similar to that of bronze. Natural molding sands give good results. Shrinkage is comparable to that of the tin bronzes—slightly less than that of manganese or aluminum bronzes. Gating techniques for beryllium copper are readily adapted to your current practice, and all types of melting furnaces have given satisfactory results.

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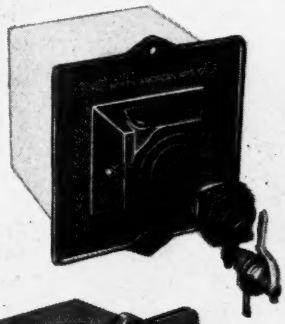
with either gas or oil are produced by the Series 113 Burners. They are desirable for vast coverage, for fewer burners and for uniformity of flame temperature.



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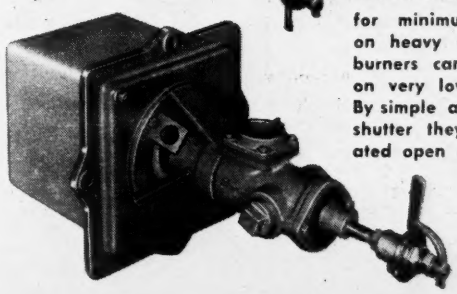
are produced by the Series 221 Burners. These burners provide a highly stable and efficient fire, using either gas or oil. They are recommended wherever heating in a relatively small space is required.



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for minimum maintenance on heavy oil. Series 225 burners can also be used on very low gas pressure. By simple adjustment of the shutter they can be operated open or sealed-in.

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Seven Burner Styles
to fit any Type of Application

★ Dual-Fuel: The North American name for burners designed especially for both gas and oil. Fuel changed by merely turning valves.

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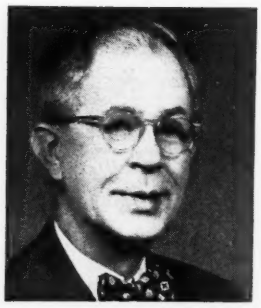
MAN-TO-MAN

on the Molder's Bench

"Overhead"



By RALPH L. LEE

MY VERY GOOD friend Paul Nydegger is supposed to have retired as superintendent after forty some years apprenticeship at the Singer Sewing Machine Co. But if he is retired, we're going to have to invent a new word for the life he's been living since he cleaned out his desk drawers.

He's been visiting foundries and factories all over Europe and the U.S.A., and the fine thing about these visits, as far as I'm concerned, is that he not only writes about them but he drops into the Lee Hobby Foundry to tell me man to man what he's seen and thinks. (Usually with distinguished European visitors in tow.)

On his last trip overseas he wrote back all hopped up on the small ratio of indirect production to direct production in Europe with that in the United States. He pointed out that our tendency in the U.S.A. is to reduce direct productive worker hours by introducing automatic machine equipment, and, from his observations, with every reduction of direct productive worker hours we add some indirect production hours, thereby making the ratio of indirect to direct continually larger.

"Some day," he goes on, "we will wake up and put the same energy on the elimination of indirect productive labor as we have in reducing direct productive worker hours."

Something tells me that I'm going clear off the deep end on this here accounting business, but even a cat can look at the queen. What I mean is the folks like me who have never pushed a pencil in a bookkeeping sense, but all their lives have been filling in forms, getting out reports and bowing and bending to the paper work systems set up by accounting geniuses, are bound to have certain feelings toward the subject and maybe a few questions.

I'll just betcha that if I were to make an actual count it would show that I have lived through one dozen campaigns to install central filing systems for general correspondence, all of which died an untimely death. I have seen drawing number and piece part systems come and go, no end. Also purchase request procedures, time keeping, expense reporting forecasts, budgets, estimating—in all stages of observance and neglect.

But of all these masterpieces of the accountant's creative ability, the one which has thrown me for the widest loop has been the mysterious formulas through which overhead is determined. I designed a washing machine, way back, and got it ready for production. With keen competition at the time, my gang and I jumped through hoops and split hairs trying to get the cost of every piece, nut, bolt and washer down to the lowest possible point consistent, of course with good quality.

After adding up all of these items we felt like raising the flag, but not for long. What the controller did to that sum with his overhead multiplier was one sin and a shame. I realize now, of course, that most of my shock was due to plain ordinary ignorance of business matters.

On the other hand, that particular experience raised a question that has not been entirely answered even to this day. Paul Nydegger's letter proved to me that I'm not the only one who flounders around a bit in the mysteries of overheads.

As a mechanic and a slowly improving amateur molder and patternmaker, I still can't get it through my head why we should figure down to the second decimal point the muscle flexings of the boys on production, together with fractions of ounces of parting, coke, pig, sand, scrap and other materials. Then with comptometers, calculating machines, adding machines, or maybe an electronic brain or two, we multiply the sum of these split penny items with some round, loose and juicy figure like two hundred, three hundred, four and yes, even five hundred per cent.

Now when the penny-pinching microscopic items of labor and material are all stirred up together with the nicely rounded out rule-of-thumb overheads into the price we insist on getting for our casting, I doubt whether anyone on earth could tell one penny from the other.

Suppose we run into a little competition with this hybrid selling price and decide something drastic has got to be done. With the three, four or five hundred per cent multiplier accepted by the gang as though it came down from Mt. Sinai with the Ten Commandments, the most natural thing in the world would be for us to get down our microscope with the 3, 4, or five diameter eyepiece on it and go at the job of shaving down every possible item on the labor and material list.

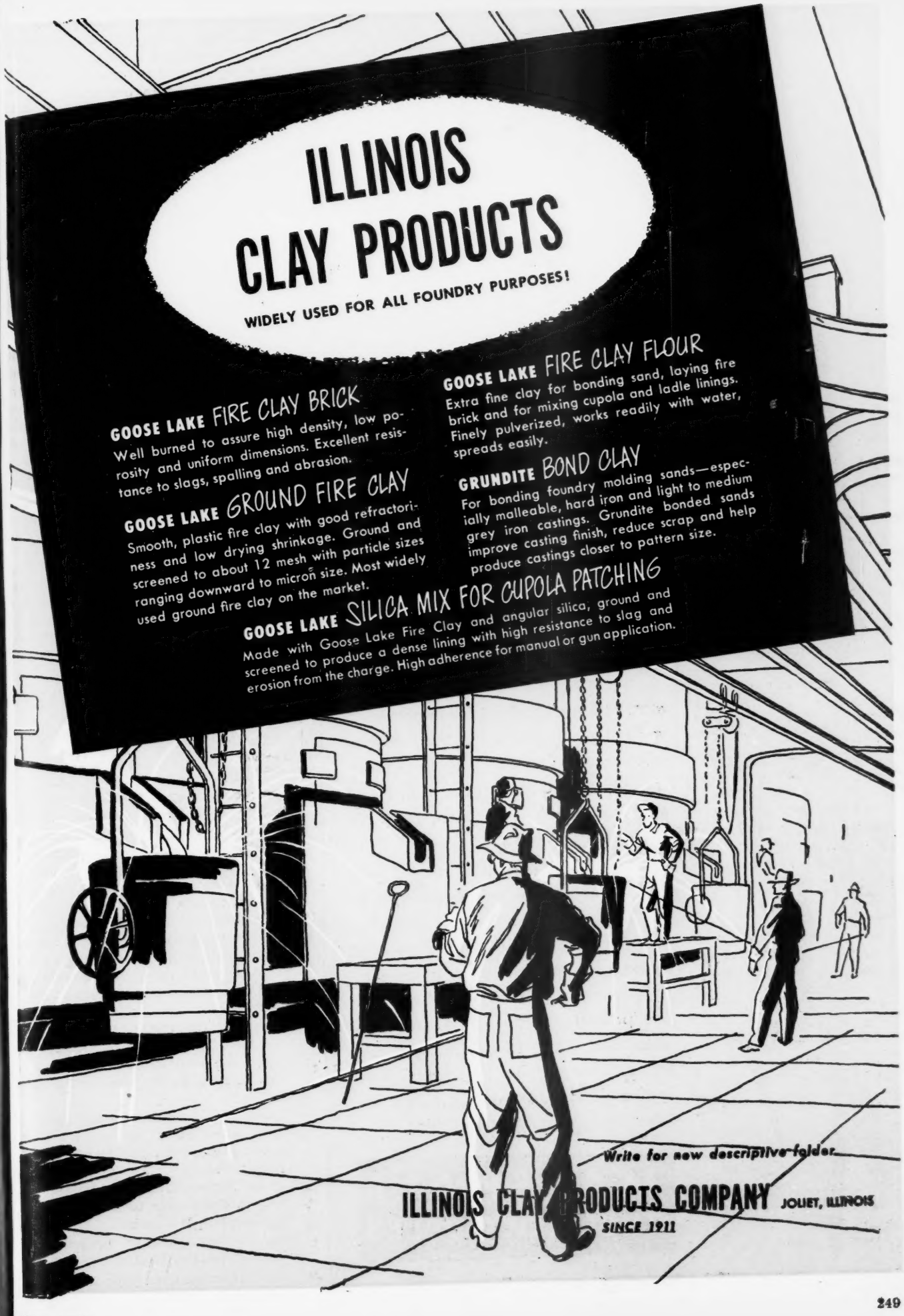
I guess that almost anyone who has been around much in this foundry business—or any other business for that matter—realizes that overhead on a $5 million chemical plant operated by a dozen gage watchers and valve twisters is bound to be an entirely different breed of cats from that for the Lee Hobby Foundry, for instance.

But just the same, the dollars that go to pay for the paper shuffling are exactly the same kind of dollars that go for molding, pouring, cleaning, and all the other jobs that are done on the pieces we sell. No, sir! The more I think about it the more certain I am that Paul Nydegger is right when he infers that our time and motion study men might have some fun roaming around among our white collar friends.

I know for a fact that on my many visits to foundries all over the country I see a wide variation in the size of the office staffs for about the same tonnage output.

The thought just occurred to me that maybe we ought to strike out of the accounting lingo the phrase

(*Concluded on page 250*)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WIDELY USED FOR ALL FOUNDRY PURPOSES!
GOOSE LAKE FIRE CLAY BRICK
Well burned to assure high density, low porosity and uniform dimensions. Excellent resistance to slags, spalling and abrasion.
GOOSE LAKE GROUND FIRE CLAY
Smooth, plastic fire clay with good refractoriness and low drying shrinkage. Ground and screened to about 12 mesh with particle sizes ranging downward to micron size. Most widely used ground fire clay on the market.
GOOSE LAKE FIRE CLAY FLOUR
Extra fine clay for bonding sand, laying fire brick and for mixing cupola and ladle linings. Finely pulverized, works readily with water, spreads easily.
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For bonding foundry molding sands—especially malleable, hard iron and light to medium grey iron castings. Grundite bonded sands improve casting finish, reduce scrap and help produce castings closer to pattern size.
GOOSE LAKE SILICA MIX FOR CUPOLA PATCHING
Made with Goose Lake Fire Clay and angular silica, ground and screened to produce a dense lining with high resistance to slag and erosion from the charge. High adherence for manual or gun application.
Write for new descriptive folder
ILLINOIS CLAY PRODUCTS COMPANY JOLIET, ILLINOIS
SINCE 1911

(*Concluded from page* 248)

"nonproductive labor." In the true sense of the words if it isn't productive it shouldn't be done and if it is productive and pays for its keep it ought to be called something else.

Since Paul's letter I have been planning to review the paper work in connection with our operations at the Lee Hobby Foundry. I have always made a practice of keeping my time on every job I do, a record of everything I buy, of my scrap along with the good ones. But since most of my customers are on a thank-you basis I have never felt the pressure of competition nor the need of an overhead factor. It wouldn't hurt, though, to run through the files and see how much of the stuff has never been looked at since the day it was put there.

Of course, there's no use denying the fact that what the foundry industry is suffering from is not too much accounting but not enough. I guess what we're talking about here (and Paul Nydegger too) is to see to it that we are not penny wise on labor and material costs and pound foolish on overhead multipliers.

It's easy to see that one whale of a lot of wasteful shennanigans could be covered up in these nicely rounded out rule-of-thumb overheads, and a lot of needless labor relations difficulties caused by the blind belief that a dollar saved on the machine, bench or floor is worth three, four or five dollars on the selling price tag.

"Tell when to pour!"

Marshall enclosed-tip Thermocouples will tell you just how hot your molten metals are! You check temperatures quickly and dependably with Marshall instruments. As a result, you pour at just the right heat.

Marshall thermocouples are modern foundry tools. You can have them in the long, right-angle-bent Type for furnace use, or the handy, straight Type for portable use, or measuring temperatures of metals in the ladle. The protected alloy tips of Marshall Thermocouples withstand repeated immersions. Write for descriptive folder. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

MARSHALL THERMOCOUPLES

Operating a Basic Cupola

(*Continued on page* 153)

In acid melting no more than 60 per cent return could ever be used, and then a sulphur of about .120 per cent required ladle desulphurization, and carbon content was not as high as desired. With the basic cupola it was possible to melt 100 per cent alloy return (used dies from the customer plus shop return). Sulphur was sufficiently low and carbon content as high as desired. The use of this scrap, with no primary alloys required, effected a net saving of $18 per ton on this particular iron.

The fourth example in Table III is a Ni-Resist iron on which a charge of 100 per cent Ni-Resist scrap, home and purchased, was successfully melted. The sulphur was reduced from .120 per cent in the charge to a final of .082 per cent and carbon content was higher than can normally be attained. The basic cupola has shown possibilities in the more efficient utilization and conservation of critical alloys where alloy irons are made.

The last iron in Table III is a low-carbon, high-strength iron with a 48,500 psi tensile from a 2-in. bar. The basic cupola seems to offer no particular advantage on this type of iron, and the low carbon is more difficult to obtain because of the increased pickup in the basic cupola. However, by reducing the flux and producing less basic slags, low-carbon irons have been produced with fair success in the basic cupola. Very low sulphurs are not obtained, but low-sulphur contents seem to be of less advantage on these low-carbon irons cast into heavy sections. As far as we know, all representative compositions of cast iron have been melted in a basic cupola, some with more ease and some with more difficulty than in an acid cupola.

Another potential advantage of basic operation is successful use of poorer grade coke. The trends in declining coke quality seem to be toward higher sulphur and higher ash content. Such coke tends to produce high-sulphur, low-carbon metal. Basic slag is very effective against both these tendencies. Satisfactory iron has

(*Continued on page* 252)

"SO THAT'S WHERE THOSE LITTLE PIGS WENT!"

CHIEF KEOKUK: Sure enough, dear! Thousands of Electro-Silvery pigs were melted down to help make the iron and steel for those skyscrapers . . .

PRINCESS WENATCHEE: . . . and wasn't Electro-Silvery used in making the metal for this boat we're on, and for tanks and tractors and automobiles?

CHIEF KEOKUK: Right! It's hard to find *any* type of product made of iron or steel that *doesn't* use Electro-Silvery!

CHIEF KEOKUK JR: Gosh, Pop, what *is* Electro-Silvery?

CHIEF KEOKUK: Electro-Silvery, son, is a form of ferro-silicon that acts as a vital control element in the production of iron and steel . . .

PRINCESS WENATCHEE: . . . and the world's largest producer of this vital ingredient is the Keokuk Electro-Metals Company!

KEOKUK

ELECTRO-METALS COMPANY

KEOKUK, IOWA

WENATCHEE DIVISION: WENATCHEE, WASHINGTON

Keokuk Electro-Silvery is used by foundries and steel plants in the form of these three pigs, weighing 60 pounds . . . 30 pounds . . . and 12½ pounds.

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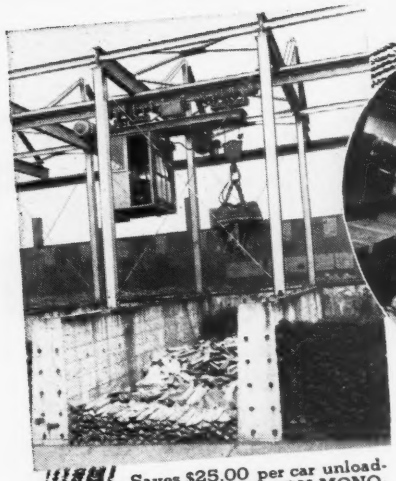
3504 Carew Tower, Cincinnati 2, Ohio

915 Olive St., St. Louis 1, Missouri



Saves $25.00 per car unloading pig. AMERICAN MONORAIL SAVES.

Free-moving cranes cover large pouring floor. AMERICAN MONORAIL SAVES.

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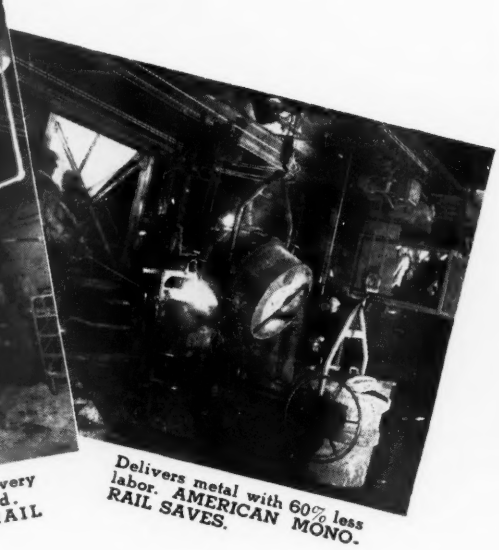
Mechanized charging brings better metal. AMERICAN MONORAIL SAVES.

Automatic dispatch delivery of fresh core sand. AMERICAN MONORAIL SAVES



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(*Continued from page 250*)

been melted from a coke with 14 per cent ash, 5 per cent volatile, and 2.0 per cent sulphur, a coke normally considered unsuitable for cupola melting.

These examples typify some of the various applications on which the cost of basic refractories have been more than offset by savings in the charge make-up. Several plants are using basic cupolas to melt large proportions of steel and/or cast scrap to hold up their output which would have been reduced because of insufficient pig iron. Other gray iron plants have put in basic linings primarily because of quality and machinability problems caused by very high sulphurs. Under some conditions local raw material situations make possible savings from proportions of steel and/or cast scrap beyond the limitations of the acid cupola. Many plants are using a basic cupola for nodular or ductile iron or for special irons because of more desirable chemistry obtained in a basic cupola.

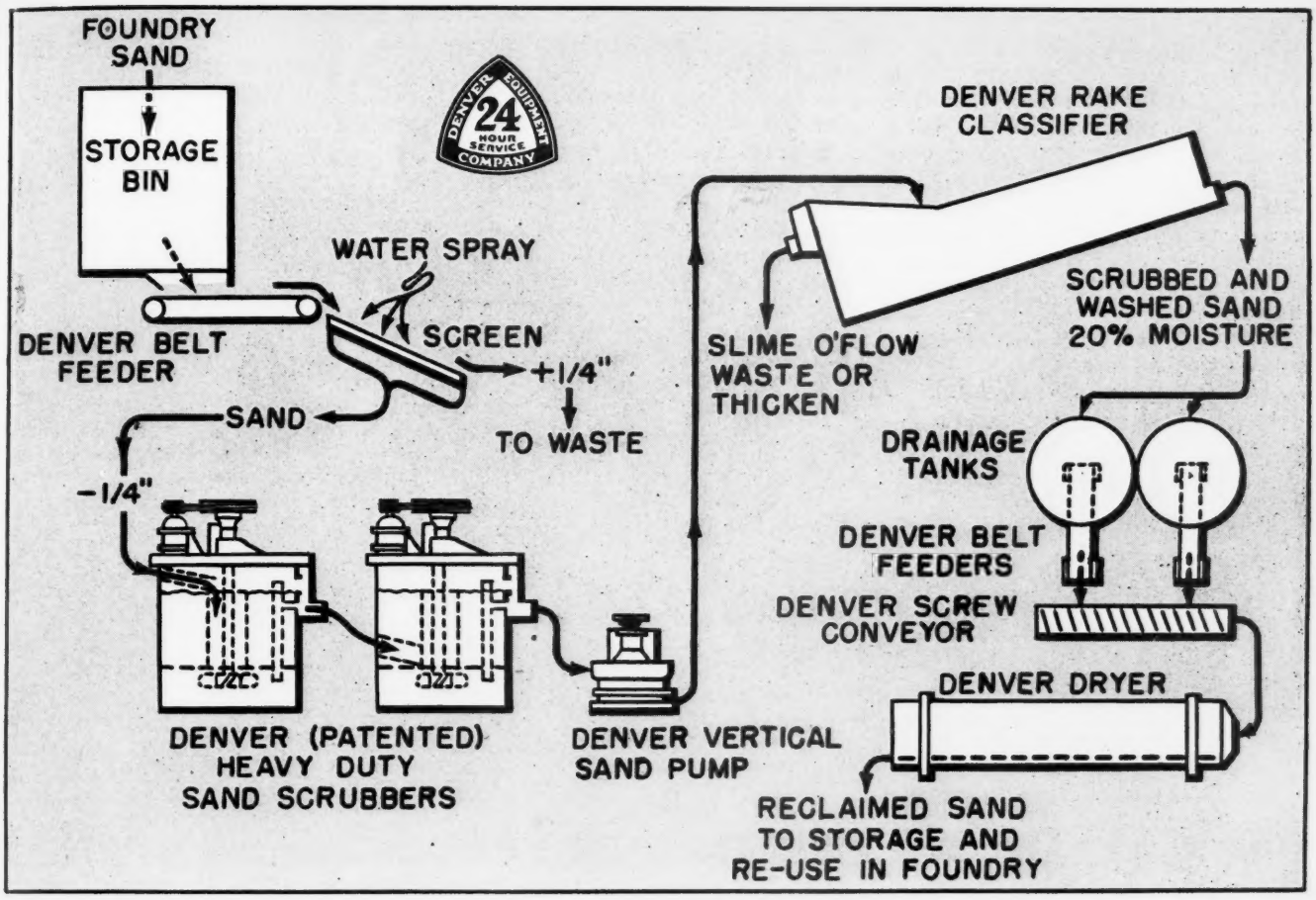
On the other hand, basic operation cannot be justified in many applications. Where high-phosphorus pig iron can be used and a sufficient supply is available locally, and when coke quality is sufficiently good, we have found no advantage yet in basic melting. On a high-silicon, low-carbon iron we found the basic cupola at an economic disadvantage. The cost of the higher silicon loss plus the increased refractory cost was greater than savings from the elimination of forehearth desulphurization.

Slag Composition and Appearance—Since the accomplishments of the basic cupola result from slag chemistry, much consideration must be given slag composition and its control.

Slag analyses, which require some experience to run accurately, do not have to be made regularly to take advantage of basic performance. However, slag composition studies have given direction to much of the past research on basic melting and will continue to be useful in developing a better understanding and more efficient utilization of basic performance.

Certain general relationships, suggested in our previous paper, have been found to apply with reasonable dependability. Occasional apparent exceptions remind us of the need for more research on slag-metal relationships and possibly sampling and analytical methods. As the slag basicity increases, the sulphur absorbed in the slag goes up and, consequently, sulphur in the metal goes down. The

(*Continued on page 254*)



FLOWSHEET FOR RECLAIMING SAND FOR AS LITTLE AS 75¢ PER TON

This simple method of sand reclamation has 3 definite advantages:

1 ***Simplicity of installation and operation.***
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3 ***Efficiency of removing spent clays, binders and carbon.***

SIMPLICITY: Equipment is standard, can be located wherever space permits. 3 to 4 ton per hour system as shown above requires space 32′ x 44′ but space need not all be in one location. Continuous operation requires minimum labor. Complete reclamation systems are available from 1 T.P.H. up.

LOW-COST: Equipment required for 3 to 4 ton per hour as illustrated above runs approximately $15,000 (piping and conveying is not included). Motors require a total of 16½ horsepower. Water can be reclaimed for reuse if necessary. Rubber-covered wearing parts give long service. Cost of reclaiming sand runs about 75c to $2 per ton depending on quantity of sand reclaimed. Recovery is normally 80% to 90%.

EFFICIENCY: Scrubbing at high densities (40% water–60% sand) results in attrition of grains striking each other. 30 minutes contact time in Denver (Patented) Heavy Duty Scrubbers is usually sufficient to remove carbons and binders. Patented standpipe prevents short-circuiting. Dewatering and rinsing is done in standard Denver Rake Classifier. Classification also controls percentage of fines in reclaimed product. Drying is done by gravity drainage or by Denver Standard Dryer.

MAKE THIS TEST Small scale laboratory tests on your sand will be made on a cost only basis. Reclaimed sand will be returned to you for complete analysis and test casting. If you are not satisfied with test results there will be no charge. Write for complete details and shipping instructions.

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DENVER EQUIPMENT COMPANY • 1400 17th Street • Denver 17, Colorado

(*Continued from page* 252)
desulphurization capacity of the slag increases markedly when slag FeO is reduced under 1.0 per cent. Sulphur removal may be increased by melting larger volumes of slag in contact with the metal. However, equal and better desulphurization has been accomplished with smaller slag volumes of more effective composition, accomplished by reduction of iron oxide content.

Table IV shows some typical slag compositions representative of several degrees of basicity. Until more accurate relationships have been determined, we have used the ratio $\frac{CaO + MgO}{SiO_2}$ as a simplified expression of basicity. Al_2O_3 has not appeared to have much effect on desulphurization and has been left out of the ratio. While MgO is probably not as effective as CaO when MgO is very high, the difference seems slight when MgO is the minor basic constituent.

For a simplified classification we have arbitrarily grouped basic slags in three ranges—mild basicity with basicity ratios 1.0 to 2.0, moderate or medium basicity with ratios 2.0 to 3.0, and high basicity with ratios above 3.0.

Reasonably good slag control can be accomplished by observing the color and luster of slag pancake samples taken at intervals during operation. Slag samples are collected at our plant in a shallow metal dish on a handle projected under the continuous slag stream.

The mildly basic slags are generally dull in luster and black in color, tending toward brown as basicity increases and FeO decreases. Should the FeO go high and the basicity ratio drop below 1.0, the black slag assumes a glassy luster characteristic of acid slags. With such a slag most of the effects of basic melting are lost and a limestone increase is necessary to restore basic behavior. Such a slag is often obtained on the first ladle from a fresh coke bed but it becomes more basic immediately.

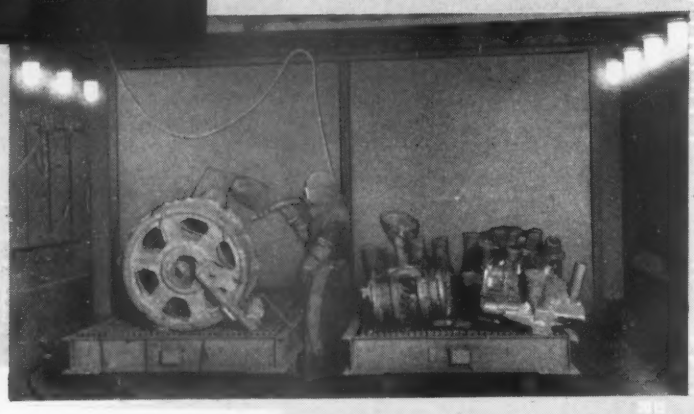
In the medium-basicity range the slags are dark gray or brownish gray. In the high-basicity, low-FeO ranges the slags become lighter gray to white. In the highest CaO/FeO ratios the slags disintegrate upon cooling into a white powder. Some calcium carbide content may be determined in the analyses and some odor of acetylene detected. Slags of such composition have been found to contain as much as 1.0 to 3.0 per cent sulphur, that has been absorbed from the metal.

To insure reaction of slag and metal with consistency, slag volume and period of contact require some degree of uniformity in basic melting. In front slagging, proper dam levels keep the metal level, slag level, and period of contact essentially consistent. In intermittent tapping it is more important in basic melting that some regularity of tapping and "slagging" be established.

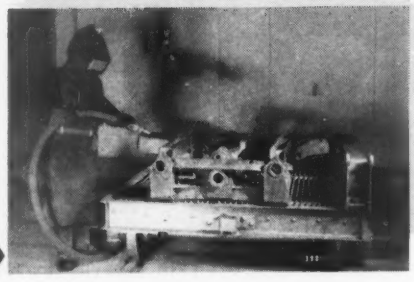
General Operation and Control—Inside the cupola the basic slag is more fluid and maintains a very clean, open cupola with less bridging and less frequent troubles resulting from poor stack permeability and oxidizing channels. On comparable types of charges and coke ratios the basic cupola seems to melt slightly faster and hotter and with better thermal consistency. These effects seem to result from cleaner, more reactive, more open coke, resulting from the ash cleaning ability of the basic slag. Because of better combustion, coke reductions can be made with resultant increases in output, if

(*Continued on page* 256)

SLY ARMOURED* BLAST ROOMS



A 16′ x 16′ Sly Blast Room with double track for two cars. Both cars can be used for a single large casting. Note how perforated floor plates keep coarse refuse from entering hopper below.



This view shows a Sly Blast Car in a Sly Blast Room. Perforated floor plates are supported by grating preventing plates from warping. Observe how tops of rails are flush with floor. Operator wears a Sly "Purair" Helmet.

Whatever Size Your Castings

And whatever your tonnage we have a standard blast room to suit. We have built blast room equipment for the cleaning of the inside of tank cars, for large airplane fuselages, for structural assemblies, tanks, railroad cars and locomotives. Some large blast rooms are self-contained buildings.

STANDARD SLY BLAST ROOMS

Inside width: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft. • Inside Length: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft. Inside Height: 7 ft. 3 in., 8 ft. 3 in., 9 ft. 3 in. • Larger Blast Rooms for special purposes.

***ARMOURED** An extra layer of detachable 3/16″ steel wear plates to protect the walls. • An extra layer of steel grating to reinforce the floor against sagging. (Exclusive Sly features)

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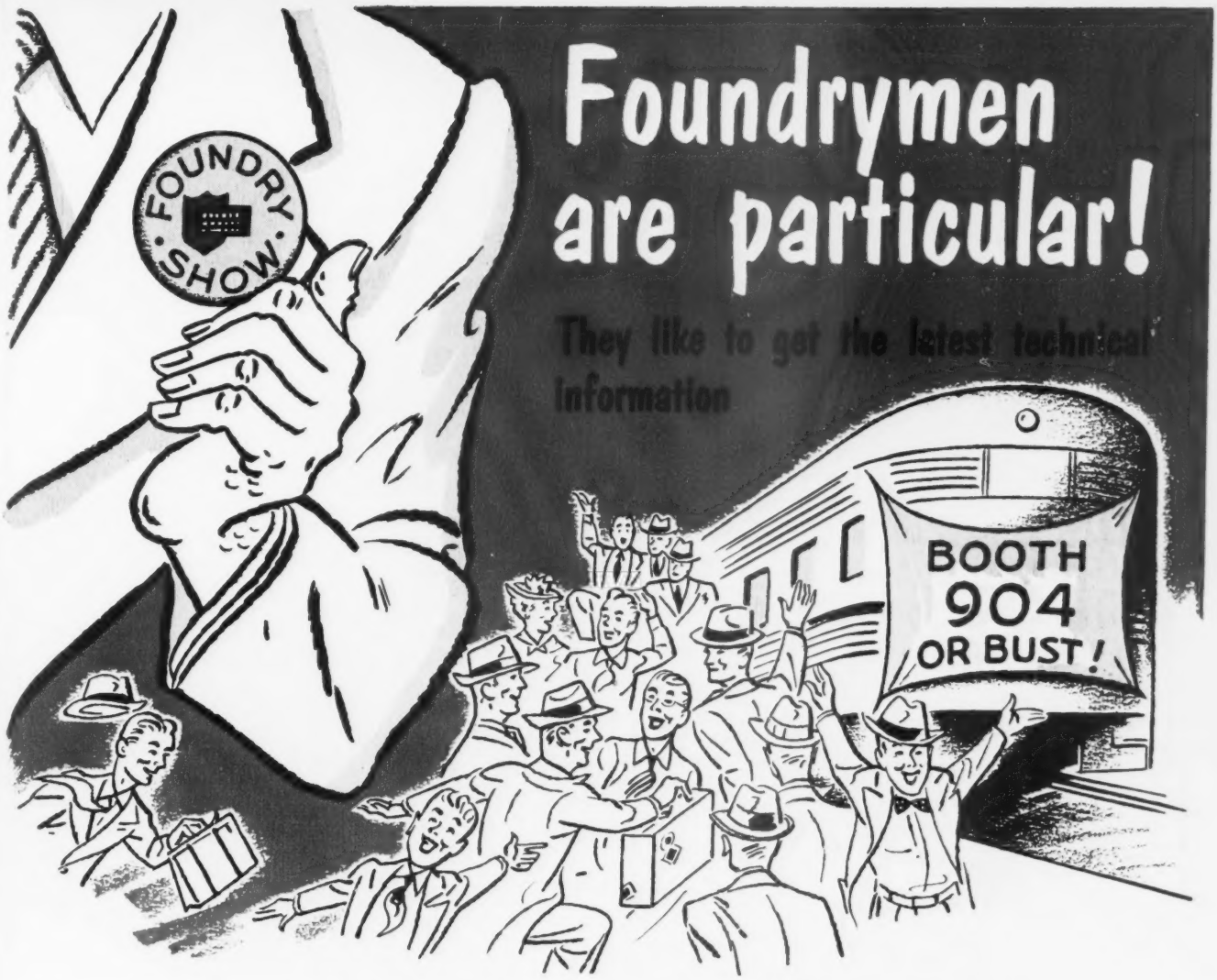

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"On the Boardwalk in Atlantic City"! That will be more than a song title when foundrymen from all over the world gather for the 1952 International Foundry Congress in Atlantic City, New Jersey, May 1 through 7.

Chances are you'll ride to the show by rail and when you do, you'll undoubtedly be riding on safe and sound railroad castings made with sand from American Silica Sand Company. From small intricate castings to huge cast steel underframes, soundness is an absolute must. And that's why so many foundries get their sand from American Silica. They know they can depend on it for the consistency that is necessary for sound castings.

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(*Continued from page 254*)

chemical objectives are not defeated. The advantages of basic melting in these respects seem to increase with poorer coke and/or dirtier charges.

With calcium carbide additions to the charge, further increases in basicity, desulphurization, carbon pickup and temperature have been produced.

The effect of preheated blast is much greater on the basic cupola than on the acid furnace. A few days' operations on 450°F blast, from an adjacent cupola, indicated to us that operation was made potentially more basic and chemically more effective by increased blast temperature.

The basic slag chills more abruptly in air and generally requires more attention to the slag run-off, especially on the more basic slags and from smaller cupolas.

From the standpoint of chemical control the basic cupola is generally more complex and requires more careful supervision. Its complexity increases with slag basicity. The problems of sulphur control and sufficient Mn/S balance are practically eliminated. Where high carbons are desired, carbon control is easier; where medium carbons are desired, carbon control seems potentially equal with sufficient experience; and on low-carbon iron control seems more difficult. Silicon consistency can be made to approach acid control, but is inclined to be more difficult to control because of the greater loss. Both the use of large proportions of irregular cast scrap and/or the use of much steel scrap with silicon added in concentrated form increase the risk of chemical variations irrespective of basicity. A high pig iron charge can not be beat for chemical and physical uniformity. Our experience has been that most of these irregularities from scrap and steel are sufficiently "smoothed out" with a receiving ladle of adequate capacity.

Since iron chemistry in the basic cupola is largely dependent on slag chemistry, factors effecting slag chemistry require better control. The flux must be calculated, weighed and charged with as much accuracy as any ingredient. Consistent refractory practice, uniform charging, and controlled quantities of dirt and sand on the scrap are necessary for consistent slag control, because of their indirect influences on slag chemistry. With some experience, flux changes can be made to compensate for changes in the physical condition and cleanliness of the metal charge. Sand on uncleaned foundry return requires additional basic flux and can be troublesome in a basic cupola.

Mechanical Properties — On gray irons of comparable chemistry (with the exception of sulphur) routine tests at our plant have shown the properties of basic iron to be equal and generally, but not always, better than acid irons of reasonable sulphur content. Sufficient data were not available on high-sulphur contents sometimes obtained from acid melting. The effects of carbon content and carbon equivalent are still more predominant factors than the difference between acid and basic melting. A cupola operator inexperienced with basic tendencies is inclined to obtain higher carbons on his first heats. These will naturally be of lower strength. With more experience and using chill tests as the principal control for the operator, we have found basic irons inclined to have lower carbon equivalents, which obviously improve strength. The basic irons seem generally less inclined toward chill, making possible a higher strength chemistry at the same chill depth. These inclinations make it difficult to compare properties without

(*Continued on page 259*)

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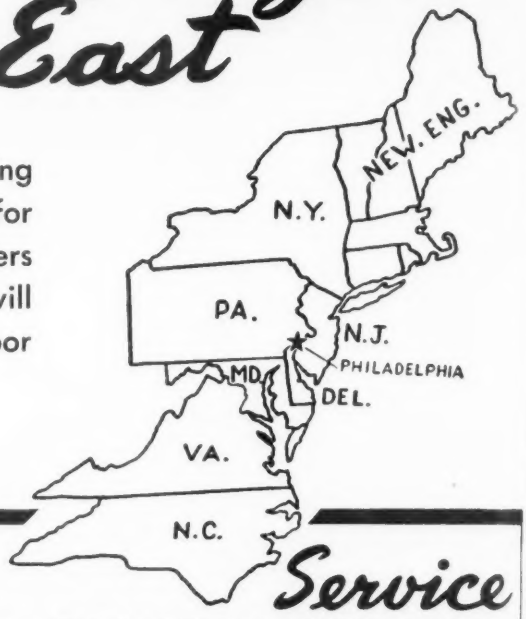

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(*Continued from page* 256)
the influence of some of these other chemical differences.

Table V shows comparative properties on routine 1.20-in. bars. Twelve acid tests averaging .089 per cent sulphur were compared with basic irons of medium basicity that averaged .053 per cent sulphur. Although chill tests averaged the same, the basic irons had a slightly lower carbon equivalent. Transverse strength and deflection on the as-cast bars, and tensile strength on the machined specimens were all higher on the basic irons. The strength-to-hardness ratio was better on the basic irons. However, the more favorable chemistry should account for much of the difference.

In order to minimize the difference in sulphur content, some of the lower sulphur acid irons were compared with some of the higher sulphur basic irons obtained when the cupola was operated with reduced basicity. These are shown in Table VI. With the chemistry more nearly comparable, the lower sulphur acid heats and higher sulphur basic heats showed less difference in properties. The basic tests showed slightly better transverse and tensile strength and a higher tensile-to-hardness ratio.

Table VII shows some comparative tests made on test bars of varying diameters from $\frac{5}{8}$ in. to 2 in. The moduli of rupture of the basic heats averaged higher on each size bar but to a greater extent and with more statistical significance on the smaller diameter bars. The tensile tests on basic heats averaged higher on the smaller $\frac{5}{8}$-in. and $\frac{7}{8}$-in. bars, but were exactly equal on the 1.20-in. and 2.0-in. bars. On the drop test the basic irons were better on three of the four diameters. These tests seem to indicate that the physical advantages of basic iron, like the chemical advantages, are greater in thin-section castings. The difference seems to be of little significance in heavier sections.

A large number of tests and more careful statistical evaluation will be necessary to determine to what extent the apparent improvement in properties is due to inherent qualities of basic melting, to differences in sulphur content, and/or to differences in graphitizing chemistry made possible by basic melting and lower sulphur.

Summary—Experience at the author's plant has indicated that a basic cupola can be operated satisfactorily for foundry production. Several basic refractories and methods of application have been successfully used. Basic refractory costs may be expected to be almost twice as high as acid costs. Due to this refractory cost and the increased silicon loss, basic operation cannot be justified where sufficient materials of good quality are available to melt acid iron with no serious quality problems. However, the added basic costs have been easily offset in a number of different applications either by improved metal chemistry or use of cheaper or more available raw materials.

With increasing experience chemical control of C and Si is becoming almost as good as acid practice. Sulphur control is much better. More careful supervision is required on flux additions, refractory practice, and charge condition as they effect slag composition. Some attention must be given slag composition control and metal-slag contact.

By control of flux additions and slag condition a basic cupola may be operated at any one of several levels of basicity. A mildly basic slag may be used with less complication where the primary objective is simply a sulphur content not excessively

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high for normal gray cast iron.

Slags of higher basicity may be utilized to obtain lower sulphur, higher carbon irons with quality advantages for some castings. Another application is the use of larger proportions of cast scrap, steel and/or poor coke with economic or availability advantages. Basic melted iron has proved very suitable for nodular iron as well as many alloy and special iron applications. From a national conservation viewpoint operation of a proportion of basic cupolas along with acid cupolas should enable the foundry industry to better utilize our poorer grade materials along with our diminishing select materials, to conserve manganese, and to reclaim scarce alloys from scrap.

References

1. Sam F. Carter, "The Basic Lined Cupola," *Transactions*, AFS, 1950.
2. Sam F. Carter, "Production Experiences with a Basic Cupola," paper to be presented before AFS annual meeting, Atlantic City, May, 1952.
3. R. A. Flinn and R. W. Kraft, "The Importance of Slag Control in Basic Cupola Operation," *Transactions*, AFS, 1951.

Editor's Note: Further discussion of basic cupola operation is contained in a paper to be presented by Mr. Carter during the AFS International Foundry Congress in Atlantic City.

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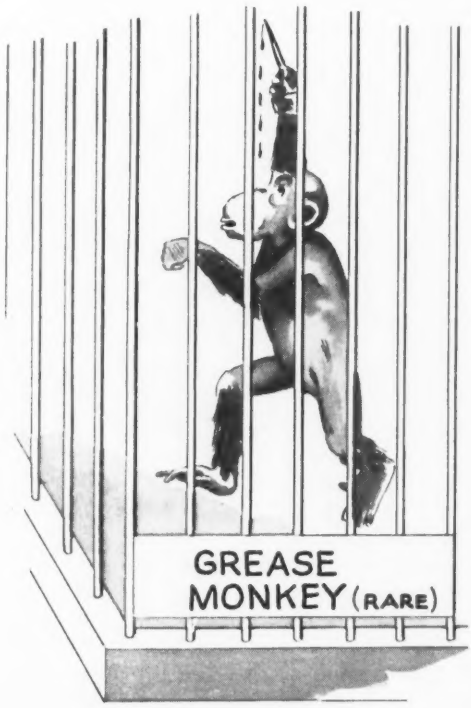

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Work Injuries Increase In Foundry Industry

Injury frequency rates in manufacturing for the first 9 months of 1951 averaged about 8 per cent higher than for the same period in 1950, according to preliminary reports received by the Department of Labor's Bureau of Labor Statistics.

Of the 137 industry classifications for which comparable data were available, 76 showed increases of one or more frequency-rate points for the first 9 months of 1951, compared with the same period in 1950; only 13 reported significant decreases; while 48 remained practically constant. Increases of 5 or more points were recorded by 21 industries, but only 2 reported decreases of this amount.

In blast furnaces and steel mills frequency rates were identical for the first nine months of 1950 and 1951, averaging 5.7. In gray iron and malleable foundries during the same period, rate for 1950 was 32.9 and for 1951, 36.4. Steel foundries showed a frequency rate in 1950 of 22.9 with a rate of 31.7 for first nine months of 1951. In non-ferrous foundries the averages for 1950's same period were 24.0, and for 1951, 28.7.

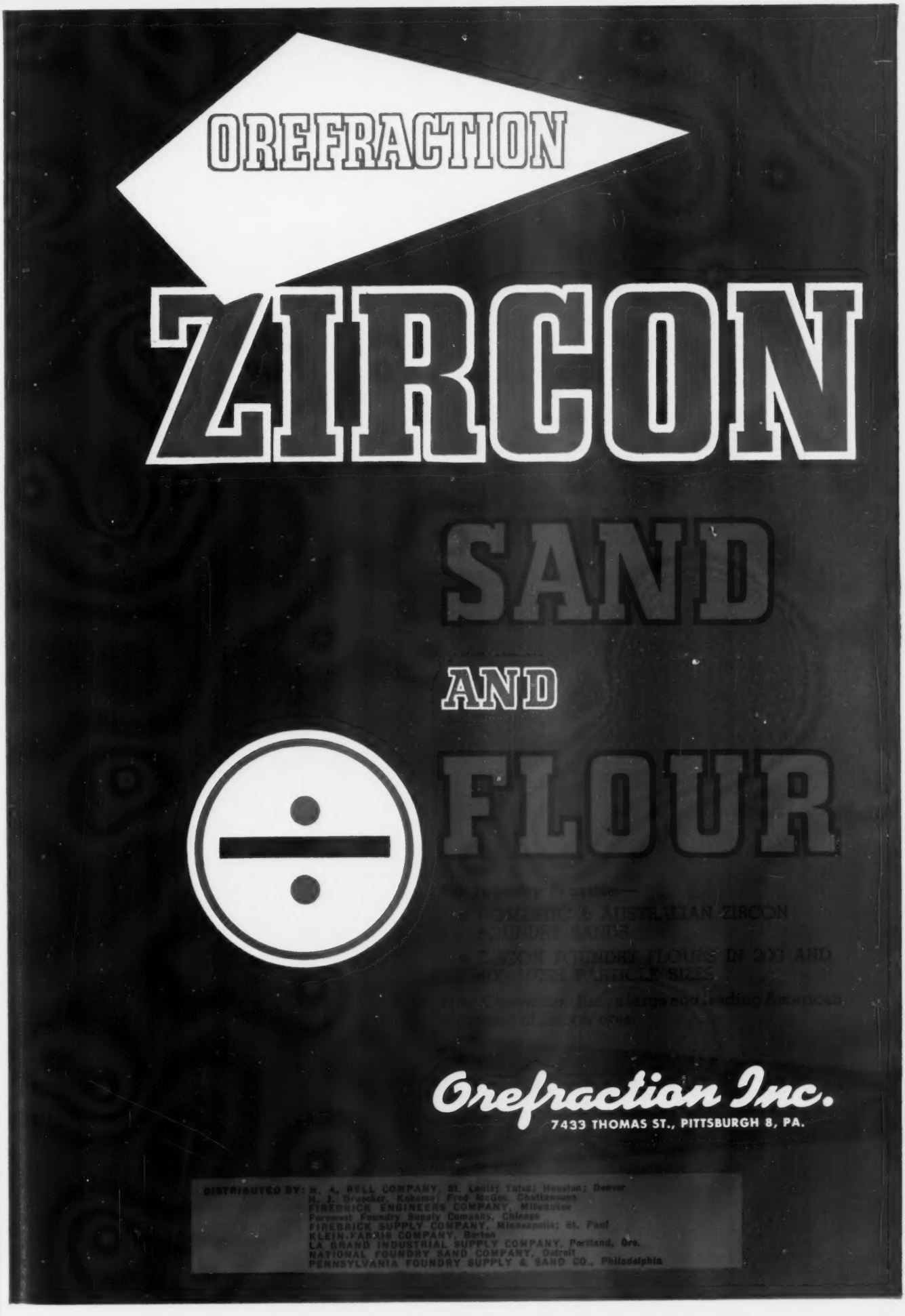
Book Review

Proceedings of The Institute of British Foundrymen, Vol. XLIV, 1951; fabricoid; 479 pages 6 x 10 in.; edited by G. Lambert and published by the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England (Registered office: 49 Wellington Street, Strand, London, W.C. 2)

The greater part of the present volume, 341 pages, is devoted to the 14 technical papers and three committee reports with discussion, presented at the 48th annual meeting of the Institute at Newcastle-upon-Tyne June 12-15, 1951. The second part of the volume contains a selection of 11 papers and discussion presented at branch meetings during the year.

Supplementary features include a list of past and present officers and council members; also a list of recipients since the founding of the Oliver Stubbs gold medal, the E. J. Fox gold medal, the British Foundry medal, the Meritorious Service medal. Five members were awarded diplomas for papers presented originally before branch meetings and read at the recent meeting. The final list showed the year, author's name and title of the Edward Williams lecture delivered annually from 1935 to 1951.

Aggregate membership of the Institute April 30, 1951 was 4773, compared with 4588 the year before.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HOW TO MOLD A LARGE Aluminum Ring Casting

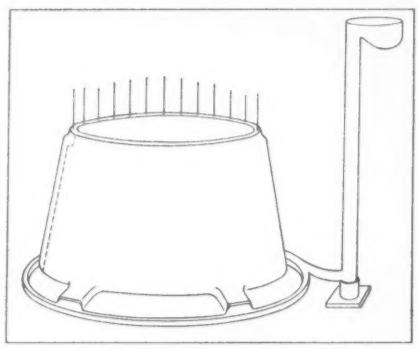
By FREDERICK H. PALMER
Neptune Meters Ltd.
Toronto, Ont., Canada

LOOKING over some old clippings from FOUNDRY, the writer came across an inquiry concerning the production of a certain aluminum ring casting. We have recently made a number of castings of approximately the same size, and perhaps some readers may be interested in our methods.

These rings were 52 in. in diameter, 14 in. high, had a 2-in. flange on top, three lugs on the base, and a wall thickness of 1⅝ in. On a previous order two years before they were made in a large three-part flask with the casting gated at the bottom and four large risers on top. In each case a certain amount of porosity was found in the wall of the casting under each riser, and considerable time was required to cut off the risers and grind the casting to shape after the risers had been removed. Metal yield was also very poor.

This time it was decided to try a different approach—i.e. to make it in a two-part flask, with no risers. As is often the case with jobbing work, no perfect flask was available; therefore the usual "taken for granted" foundry ingenuity had to be called upon. The only suitable flasks available were two cast iron middle parts—one 7 in. high to use as a drag, and one 18 in. high to use as a cope—just large enough to allow a deep narrow gate all around the pattern.

There were no pins in the flasks, but on the outside flanges of both parts were some 1-in. holes. These did not match up, but we found four holes which, with a little overlap, would take a ¾-in. bar, so we cut bars to use as loose pins. They gave a tight fit and worked very satisfactorily. The drag was laid face up on the board and rammed up, the pattern laid on it, the cope put on with the loose pins in place, and wood bars cut to fit in the cope. This was a matter for some thought since the inside of the cope was straight cast iron with no flanges, and the only place available to wedge in a bar straight across the flask was the 4 in. above the pattern.



Metal entered mold through a ring runner and gates around bottom

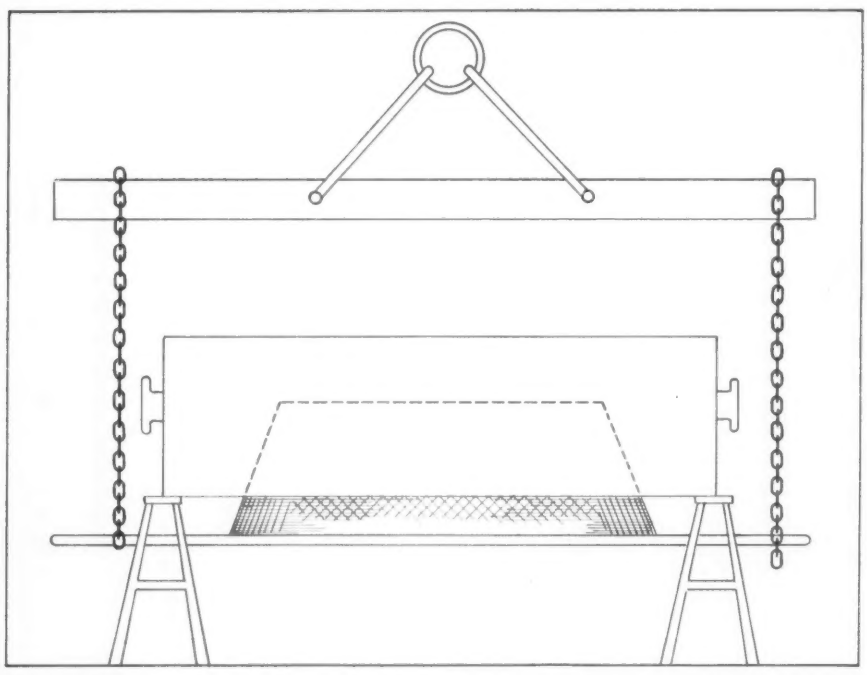
Most of our sand weight was from the pattern to the corner of the flask, and to carry this we put boards across the corners about 3 in. from the pattern, nailing them as securely as possible to the bars across the top. We then lifted the cope off; all bars stayed in place. We wedged them a little more securely, then laid iron rods across the top of the flask and wired all bars to these rods.

The bars were then thoroughly wet to make them swell as much as possible, and thus hold more securely. The center part of the ring pattern was now rammed up firmly and well vented. Where the downgate would drop, a hard sand core slab was let into the drag and an aluminum pouring cup rammed on top of it, with the top edge level with the joint; this was to take the fall of the first metal and prevent possible erosion. The cup was temporarily filled in and the joint made. Next the pattern was well rapped, the cope clay washed and put into place, ¼-in. of sand was sieved over the joint and then it was well gaggered.

About half the gaggers used were made from ⅜-in. rod with a 1-in. bend on the top, to hook over the bars on the side of the box. A 1¾-in. tube was inserted as the downgate, 4 in. of sand put in and rammed quite hard. Subsequent ramming was firm, but not quite so hard, with good venting as it was rammed, and with a 2-in. vent hole put in the center of the cope. The rapping of the pattern before the cope was rammed up, and the firm ramming of the cope, was done with the thought in mind of lifting the pattern with the cope. The chance had to be taken on this first mold that the pattern would lift without hooks. This it did—also on each mold thereafter—and a very clean lift too.

Because the cope had no inside flange and the bars were only wedged

(*Concluded on page* 266)



A long plank suspended from the crane beam was drawn up tight against the pattern in the cope. When the plank was lowered the pattern came with it

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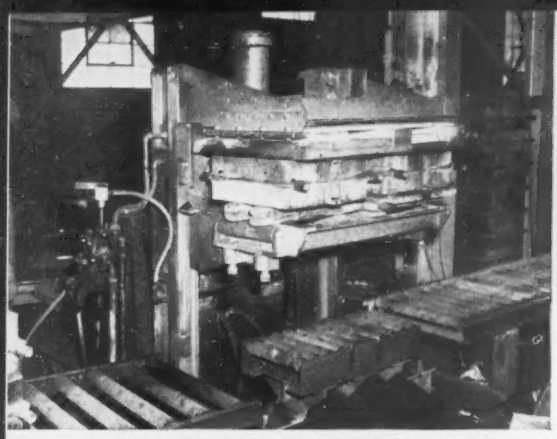

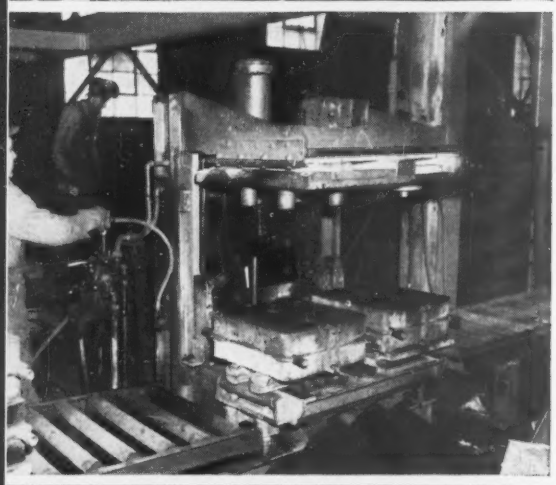

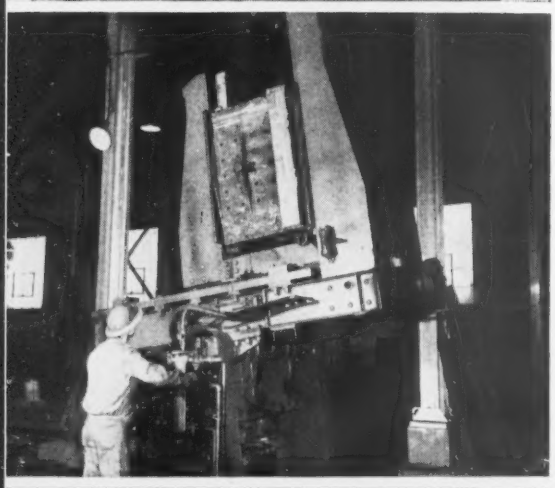

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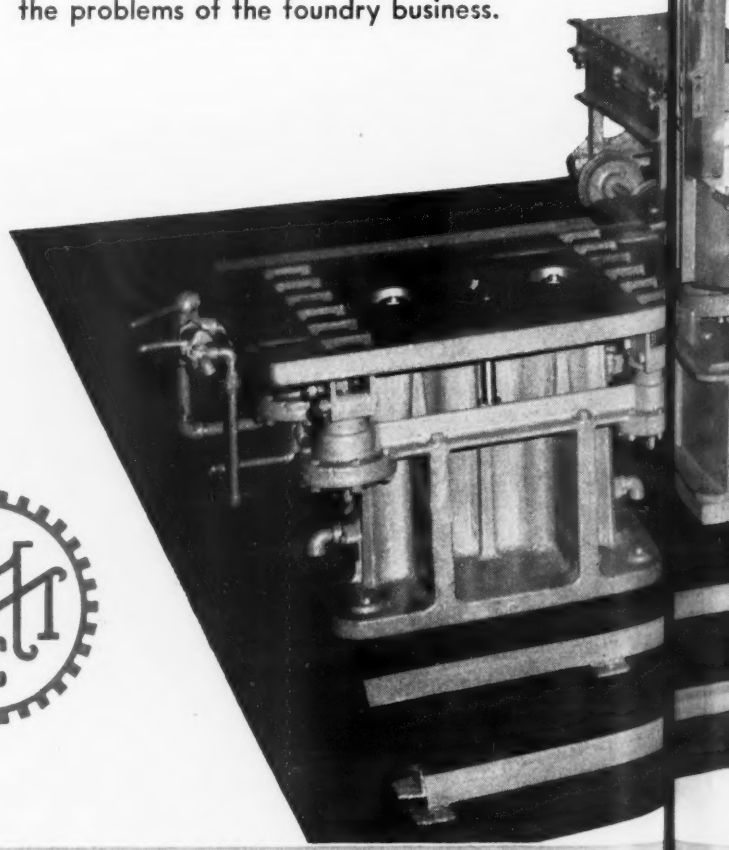

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(*Concluded from page 262*)

in, it was deemed advisable not to roll the cope over as usual, so it was placed, with the pattern still inside, on two steel trestles. Then the lifting beam on the crane was lowered so that the lifting chains, one on each end of the beam, came below the level of the flask. A 6-in. plank was slid through one chain, under the flask and into the other chain; the beam was then hoisted until the plank touched the pattern. Two molders now got under the flask and with rubber mallets rapped the pattern all round until it moved and was resting solidly on the plank. While still being rapped, the plank and pattern were gradually lowered the 14 in. necessary to clear everything. By this method we had very good draws—and very little finishing to do.

The gate was cut in the drag and brushed with dry graphite. Vents in the center core of the ring were all scratched out to connect with the 2-in. vent hole in the center of the cope. All around the top rim of the casting a ⅛-in. wire was pushed right through the cope, and out the other side. Loose sand was blown off and paper laid all over the top, then loose sand was laid all over the paper. A 1¾-in. tube was placed in the downgate, and bench molding flasks (12 x 16 in.) placed around it to a height of 24 in. These were rammed up and a good-size pouring basin cut into the top.

The mold was closed, metal well fluxed and allowed to stand for some minutes, then cast at 1350° F. No plug was used as the large runner head enabled us to choke the gate. When some metal came through the vents, casting was instantly stopped; a few shovels of sand on top of the cope prevented too much metal running over the cope. This was pulled off after a few moments. The casting was allowed to stay in the mold overnight.

Made in this way, the metal yield was excellent, molding time was good, and very little cleaning time was required. Each casting retained its shape perfectly and machined up to a fine finish. Weight of the casting was 350 lb.

Booklet Describes Foundry

Texas Electric Steel Casting Co., Houston, Tex., has published a booklet describing various phases of its operation and portraying some of the castings it produces. Included are definitions of foundry terms and tables and charts showing properties and specifications of various steels. The booklet is printed in three colors and is profusely illustrated.

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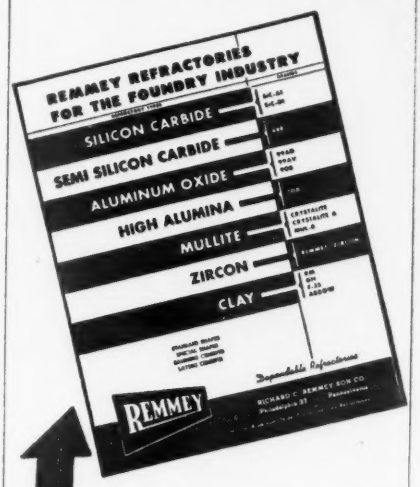

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Manufacturers of Silicon Carbide, Mullite, Aluminum Oxide, Zircon and Clay Refractories

75% SAVINGS ON STORAGE and SHIPPING SPACE!

PALLETAINER sides fold down to 25% of opened size for storage and space-saving returns—favorable rates promote PALLETAINER shipping.

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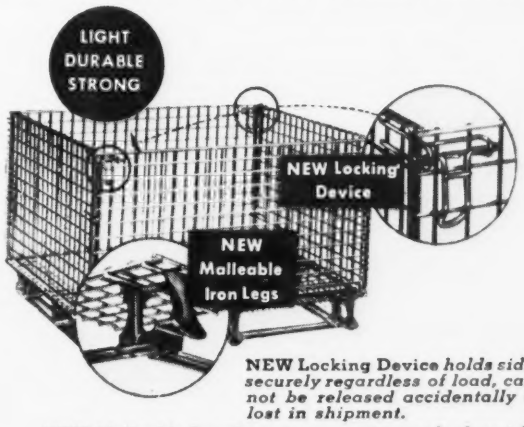
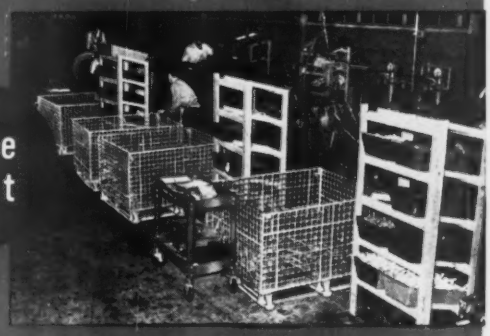


NEW Locking Device *holds sides securely regardless of load, cannot be released accidentally or lost in shipment.*

NEW Malleable Iron Legs *incorporate a wide throat for fast, easy stacking with welded base construction to form a supporting section that is practically indestructible.*

Parts flow through processing and to transport as unit loads—a major improvement in operating methods.

move it



Ceiling height stacking utilizes ALL available storage space. Storage is organized, protected and fully visible.

stack it

The **PALLETAINER** *is the lowest cost per trip container, effects real economies in faster loading—reduces dock congestion — preferred for returns.*

ship it

SYMBOL OF QUALITY

USP

UNION STEEL PRODUCTS COMPANY

Materials Handling Division

ALBION, MICHIGAN

Adventures of BILL

By PAT DWYER
Illustrations by RICHEY

WHILE I was busy speculatting on how to apply the minimum amount of physical effort to the hanging of a swinging seat on the back porch of the little cot in the dell, Bill came prowling around and generously offered to lend a hand.

"You have been hatching on that problem for a month," he said, "and at your present rate of progress you may—I don't say you will—but you may have the job finished about the time Santa Claus parks his sleigh in your driveway next winter. Maybe I had better take that back and use some other comparison. In the good old days, a bet on Santa's appearance on schedule was as good as money in the bank or wheat in the bin. Under present conditions I doubt if Lloyd's of London would risk a penny on his appearance this coming Christmas.

"Kindly step to one side me boy, and let an old professional swinger show you how to swing a swing." Well, I did and he did, and now I live in the hope he will come around next fall and—with equal enthusiasm—help me take down the swing and put it away for the winter. Naturally, of course, I expect to do my share of the heavy work.

However, hanging the swing is only half the battle. It must be tested under working conditions to adjust any little discrepancies in balance and motion. We sat down comfortably side by side to enjoy the pipe of peace and, incidentally, let the rest of the world go by. 'Tis a very soothing occupation. Bill proceeded to explain that we needed a period of rest and relaxation.

"Next week," he said, "we'll be caught up in a whirl of activity with foundrymen and their ladies pouring into Atlantic City by every mode of conveyance with the possible exception of the covered wagon. According to advance publicity this will be the largest and most gorgeous crowd of foundrymen ever gathered together at one time in one place. Great doings are projected for every day and every night, with overtime jobs Saturday and Sunday. So far as I can see only one feature has been omitted."

Soft and gentle answer sometimes raises the temperature

"You have better eyes than I have Bunco Tim. I have looked over the program and my only wonder is how it possibly can be staged in one week with time and a half and double time on Saturday and Sunday."

"Well," Bill said, "I'll tell you. To start the thing off with a bang in the well known and popu'ar American tradition I should like to see the boys lined up four abreast the first morning at the far end of the board walk. Then have them march up to the convention hall with a rousing band at the head and tail and with a few more bands sandwiched in here and there about three blocks apart. Let all the permanent and temporary inhabitants know we are in town, ready to take it apart and see what makes it tick."

"The idea," I admitted, "has its fine points and reflects great credit on your original and inventive faculty, but you have overlooked one point. Trifling, it is true, but one that I am afraid would prove embarrassing. Outside of a few horny hoofed individuals like yourself, you could not coax, persuade or even bribe any person to march that distance or, as the boys say, any fraction thereof. You can count me out right now. In the regular course of events I expect to walk at least 211 miles during the seven days and nights we are in Atlantic City. In all fairness I submit that is enough walking for any ordinary human being."

"With your gift of imagination you should be writing fiction instead of working for a living. I'll lay you odds of 7 to 1 in any reasonable amount up to 4 bits that if you attach a speedometer to one of your bandy legs it won't register a total of 10 miles for the entire week. Half of that distance will represent exploring trips for out of the way eating houses and most of the remainder will be consumed getting into and out of wheel chairs.

"You should welcome the opportunity of taking long walks, of stretching the legs, of filling the lungs with great drafts of the briny breeze, spume and spindrift laden with salt whistling in from the open ocean, and the only feature that—up to the present—is still free. You keep on at the rate you are going and the first thing you know the old dogs will quit cold on you some day in the not too far distant future. You will have to hire a handy lad to push you around in a wheel chair."

"Bill," I said, "if you were a reasonable human being, which you are not, I could present at least 47 argu-

(*Continued on page* 272)

Introducing the New, Improved

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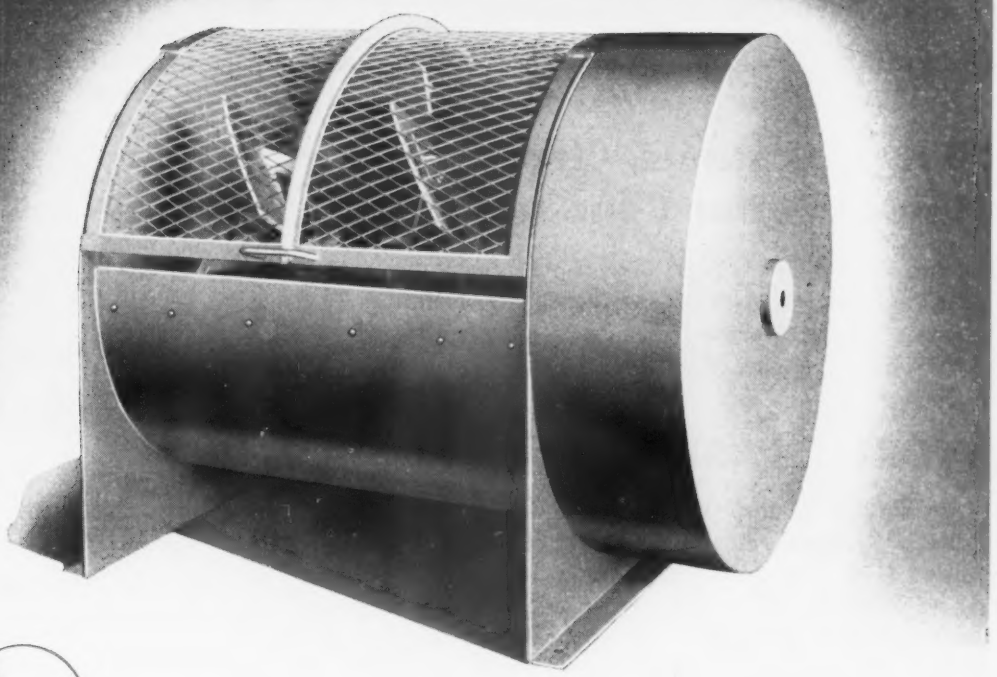
for mixing Core Sands, Molding Sands and Cupola Patch Mixes



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NO CLUTCH
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LOW OPERATING COST

MIXES IN 4 MINUTES • DISCHARGES IN ½ MINUTE!

● "Better Mixes"... at a lower cost. That's why you'll be interested in the new MULTI-MIXER, Model AG. This is a completely new model... designed and built with the experience and knowledge gained from 1500 units now in operation. Here is a compact, efficient mixer in a range of sizes from 3 to 60 cu. ft. capacity. We believe it to be the most modern equipment of its kind on the market today... for better cores... better castings, write for complete details.

Note these time saving features:

- Completely Self-Contained
- Low Installation Cost
- Anti-friction Bearings
- Direct Drive Motor
- No Clutch or Belts
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- Quick Acting Discharge Door
- Rubs, Turns, Kneads — 10 times in Each Revolution
- Equipped with Manganese Wear Resistant Liners and Paddles.

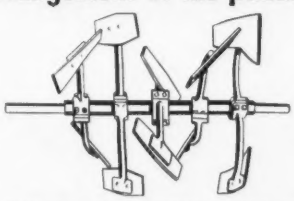
MULTI-MIXERS are sold only thru nationally known foundry and equipment dealers. Consult your supply dealer or write direct.

THE SECRET

of the New Multi-Mixer

PERFECT MIX

is the patented, scientific arrangement of the paddles



IT KNEADS, AS IT TURNS, AS IT RUBS
10 · TIMES FOR EACH REVOLUTION

MULTIPLEX MACHINERY CORP. ELMORE, OHIO

How to be Indispensable to an I

Castings come first.

Castings mean mining and oil-drilling machinery—freight cars and locomotives—looms and lathes—rolling mills and bottle machines; and so ad infinitum.

To an extraordinary degree castings come first—for no industry can manufacture its producing equipment without castings.

The Foundry Industry is indispensable to America's industrial economy.

"Better Castings, Cheaper, Under Better Conditions"

The function of Hydro-Blast is to be fundamentally useful to that Indispensable Industry—to enable foundries to make better castings, cheaper, under better working conditions.

HYDRO-BLAST — Originator

Hydro-Blast originated the water-sand-blast method of cleaning castings. That method has had, will continue to have, wide use in foundries. In core knockout and surface cleaning, it produces cleaner castings, in a fraction of the time and at a fraction of the cost of older methods; and it is completely dustless.

Hydro-Blast originated a method of reclaiming refuse sand—a method that is commonly recovering 85 to 90 per cent of sand formerly dumped as refuse. Savings effected by many sand reclamation systems are repaying the entire cost in less than two years.

Hydro-Blast has evolved and proved a method of removing dust from air by means of high-velocity water jets. Results are extraordinary.

Continuous research in those three areas of usefulness is a basic element of Hydro-Blast service—research aimed at constant improvement of methods and of mechanisms to implement the methods.

Each Installation a Custom Job

From the nature of the foundry business, it has never been practicable to build a "package" Hydro-Blast. Every installation since Hydro-Blast was established has been an individual and specific problem subject to special engineering study.

Thus Hydro-Blast usefulness is measured by the thoroughness of Hydro-Blast engineers in appraising the problem and the effectiveness of their solution for it. That they have done a consistently good job is indicated by the partial list of leading businesses that use Hydro-Blast.

Since 1934 the motivating purpose of Hydro-Blast has been unchanged: To be economically indispensable to an Indispensable Industry.

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Booth 1217

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INDISPENSABLE INDUSTRY

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Wet Sand Reclamation Systems

Wet Blast Castings Cleaning Rooms

Wet Blast Castings Cleaning Cabinets

Wet Blast Castings Cleaning Barrels

Continuous Blast Cleaning Units

Wet Blast Deburring Equipment

Wet Blast Descaling Equipment

Dust Knockout Systems

A PARTIAL LIST OF HYDRO-BLAST USERS

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American Manganese Steel
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Black-Clawson
Bucyrus-Erie
Carnegie-Illinois Steel
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Clark Bros.
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Crane
John Deere
Dominion Engineering (Montreal)
Erie Engine & Mfg. Co.
Erie Forge
Fahralloy, Ltd.
Fairbanks-Morse
Fiat (Italy)
Frick Company
General Electric
General Iron Works (Denver)
General Metals
General Motors
- Cadillac
- Central Foundry Division
- Fabricast

Gisholt Machine
Gould Pumps
Greenlee Bros.
Haynes Stellite
F. S. Lloyd, Ltd. (England)
Lynchburg Foundry Company
Massey Harris
National Bearings Metal (Brake Shoe)
National Malleable & Steel Castings
Ohio Steel Foundries
Renault (France)
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Toledo Machine & Tool
U. S. Naval Gun Factory
U. S. Navy Yard, Brooklyn
U. S. Navy Yard, Pearl Harbor
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CHICAGO 47, ILLINOIS

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Spain— Talleres Auxiliares De Fundiciones S.L., Apartado 10, Zarauz (Guipuzcoa) Spain
Italy— Azeta, Viale Tunisia 41, Milano

(*Continued from page* 268)

ments to prove that you and all the other exercise sharks are wrong. Who die, who are crippled, who are all in before the half century mark? The famous athletes my lad! Ordinary common sense, if you had any, should tell you that a man who takes care of his feet will have the use of them longer than the man who continually pounds the life out of them. Remember what Poor Richard said: Take care of your dogs and your dogs will take care of you."

"Poor Richard, hey? Oh! You mean the Philadelphia almanac guy. He seemed to know something about nearly everything, well, with the possible exception of the foundry."

"You are wrong, as usual," I said. "He invented the Franklin stove. An invention which involved the production of castings in a two-part flask, cope and drag, instead of the former method confined to casting flat plates in open sand molds. If Ben were alive today he would be in line for a gold medal and honorary life membership in the American Foundrymen's Society."

"By a curious coincidence," Bill said, "I had a letter around Christmas time from a lad who was thinking of submitting a paper at this coming convention. He complimented me by asking me for an opinion on the subject and his method of treatment. Kindly bend one of your long ears in this direction. I am not going to read the entire paper, just the title.

" 'Dear Bill: Following a rather severe session of fasting and prayer and in preparation for the convention in Atlantic City I burned a few gallons of midnight oil and composed a rather simple and elementary paper entitled The Lackadaisical Lateral Relationship Between the Liquidus and the Eutectic, Above, Below and Between the Critical Ranges as Laid Down By Our Beloved President in a Recent Message to the Faithful: Grab What You Can Get. This Won't Last Forever, and Keep Your Big Silly Trap Shut.' "

"A truly modest lad," I commented, "and a credit to our profession, which always has been noted for modesty in word and deed. I trust you removed the hide as gently and painlessly as possible, before nailing it to the door of the old red barn."

"No skinning and scalping in this deal. I had seen some of the old boy's work many years ago when he and I were members of the Associated Foundry Foremen. I simply picked up the ball and threw it back to him. As gravely as the subject warranted I pointed out that the paper was too simple and elementary. In my well considered opinion the erudite, technical and critical audience wanted something more advanced, something more in line with the familiar foundry legend about the molder who made five castings, all bad. When the foreman in the usual polite and tactful manner requested an explanation of the remarkable performance, the honest yeoman answered him simply, truthfully and courteously. 'One dropped' he sez, 'one flopped, one ran out, one was poured short and the other was just a plain waster!'

"Recently I had another and a different type of letter from a man who wrote at some length as follows: We have made planer table castings for many years without defect of any kind. These castings, 4 x 14 ft, are molded and cast with the face in the drag and the ways in the cope. Recently we have found small cracks or tears in the drag face. The cracks do not appear until the standard finish allowance of ½-in. metal has been removed. Each crack is about ½-in. in length and penetrates to a depth

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Many of the leading foundries--both large and small --in the United States and Canada are using Buckeye Silica Firestone for slag hole blocks and for lining and patching the melting zone of cupolas.

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between 1 and 1½-in., where it opens up to a considerable extent. Number of defects per casting varies from one or two up to as high as a dozen or more. We have tried different metal mixtures and different types of blacking. We have raised the permeability of the sand, but without effect. At present we are changing the venting, construction and composition of the lightener cores to determine if they are responsible for the trouble.

"That is the end of the quotation and seems to present the salient features of the problem in a fairly satisfactory manner. However, I have noticed that an actual face to face discussion is better than any written description.

"The form of defect known as a hot tear is much more prevalent in steel than it is in gray iron castings. For that reason it has been discussed more freely among steel foundrymen than among men engaged in the production of iron castings. An extensive paper on the subject by Briggs and Gezelius was presented at a foundry convention several years ago. The paper, with written and oral discussion by several prominent steel foundrymen, is incorporated in the *Transactions* of the AFS, vol. 41, 1933 commencing on page 385. However, it is only fair to point out that the paper is largely theoretical. One commentator, as well known for his wit as for his erudition and elegance of language, remarked that while the paper might be read in considerably less than an hour, a proper discussion of all the features easily might require ten hours.

"In the present instance and from a practical shop viewpoint I am inclined to the opinion that the composition of the metal and, to a certain extent, the rigidity of the cores are responsible for the hot tears. This opinion is based principally on the fact that these and, presumably, similar castings were made for many years without any trouble. Foundrymen generally are familiar with the fact that two irons of the same analysis may show wide variations in physical properties. Some irons—for example, those used in ingot molds—will withstand repeated heating and cooling, while castings made from other irons of approximately the same analysis will crack with the first heat. It is reasonable to assume that, under former conditions, the iron poured into planer tables was of a character that stretched a little instead of cracking. The proposed plan to render the cores more readily collapsible may solve the problem. With a hot short iron, the

A Chronology of . . . . RADIUM RADIOGRAPHY

1930— First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".

1935— First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.

1938— AFA questionnaire revealed that 8% of steel casting men used radium radiography.

1941— 22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.

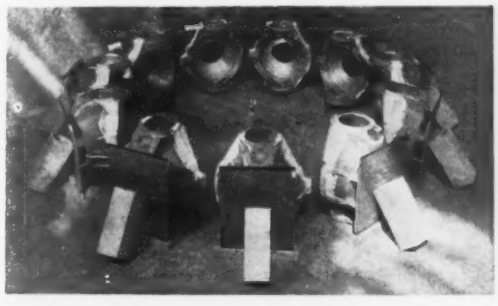
1946— 150 steel foundries rented or leased radium.

1947— American Society for Testing Materials issued Radiographic Standards for Steel Castings. (Gamma Ray). E71-47T.

1948— 200 steel foundries rented or leased radium.

1949— Revision of the U. S. Navy Universal Exposure Calculator for Radium Radiography by N. A. Kahn, E. A. Imbembo and J. Bland, New York Naval Shipyard, Brooklyn, N. Y.

1950— 250 steel foundries rented or leased radium.



Large number of castings being radiographed simultaneously

Radium radiography has improved production of steel castings and effected economies. The apparatus is simple, requires no special training to operate, is portable, and most important, involves no capital expenditure. The apparatus may be bought, leased or rented. Investigate our claims, and write today for additional information.

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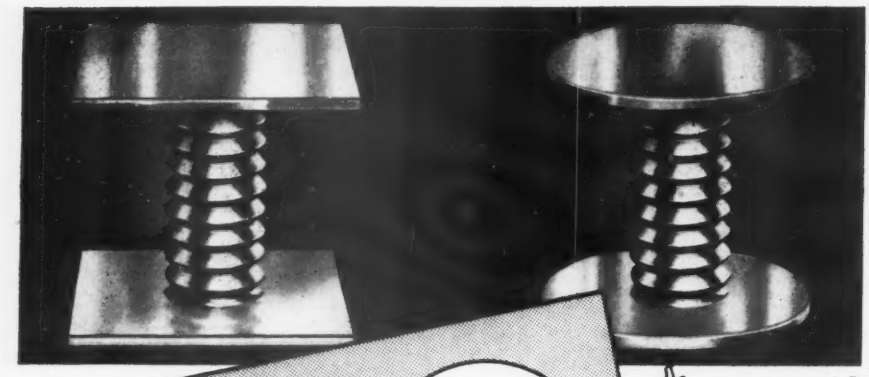

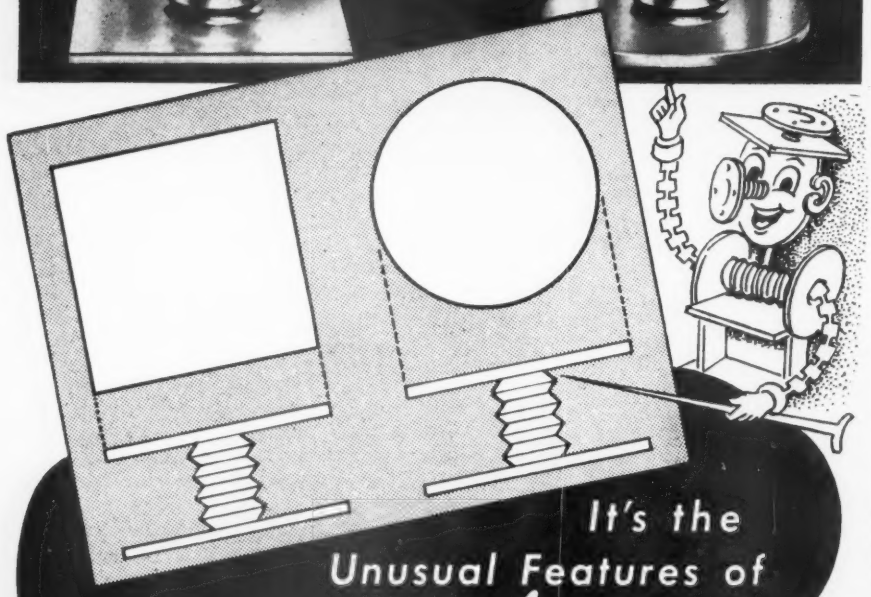

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Unusual Features of
Milwaukee
CHAPLETS
that Insure Instant Fusing
in any Casting

It's the sharply cut "thread stem" design that insures instant fusing. Metal melts at the edges first, that's why the sharp edges "burn in" quickly and completely to insure instant fusing which results in freedom from leakers. As the fusing cycle slows up through the base of the thread and into the stem itself, there is ample time for adequate and proper core support. Here is a design where fusion takes place at exactly the right speed to give you both instant fusion plus proper core support.

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resistance offered by a set of rigid cores may have caused the metal to crack.

"Attention is directed to another possible contributory factor, the position of the casting in the mold. Metal thickness in the drag face is greater than the thickness of metal on the opposite or cope face. The comparatively thin upper side, also the interior brackets and cross braces, cool more rapidly than the thick section and thus prevent proper directional solidification. The pattern should have been designed and drafted to be molded with the thick part on top. Heat radiates more rapidly from the top of a casting and for that reason the casting has a chance to cool more uniformly.

"A minor feature, but one that is of some importance if you must continue molding the job as at present, is the position of the gates. Presumably the mold is gated at or near the bottom at one or at both ends. This accentuates the problem of directional solidification since the hottest metal is in the bottom or thick portion, while the coldest metal is in the top or thinner part. As a partial remedy the metal might be poured through a number of small pop gates on the top.

"A small piece of the casting which arrived after the foregoing was written suggested another solution of the problem. The character of the cavity indicated that it was produced by a jet of steam or gas that may have come from the sand in the drag or from the T-head bolt cores. Probably a considerable amount of gas entered the metal. The greater part passed through and escaped, but small amounts here and there were trapped and held in suspension. Immediately below the resulting cavities the casting skin was weakened. Presumably the pattern is cambered to offset the natural warpage. The solid metal holds while the casting is springing from a cambered to a straight line, but the weak area below the cavity cracks.

"The obvious remedy is to vent the drag more thoroughly whether it is green sand or skin dried. It may be advisable to check on the coke bed and on the permeability of the facing and backing sand. A coke bed that is used too often becomes choked with sand and loses its efficiency. It might be well also to check up on the method of setting the long slot cores in the drag face. A careless or ignorant molder may drop these cores into place without first using a vent wire between the bottom of the core print and the coke bed."

You Can Stop Costly Interruptions of Core Production Schedules with

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THERE ARE MANY OTHER ADVANTAGES OF DUPLICAST, TOO!

- Save up to 80% on core box replacement costs.
- Fins in castings are eliminated because of exact duplication of accurate core box cavities.
- No sampling or checking is necessary when a new core box is put in production.
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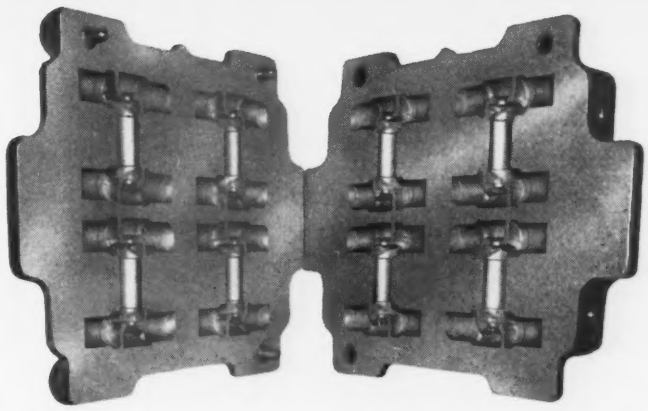

"The Expendable Core Box" is exactly what this slogan implies—because with Duplicast it is cheaper to replace than to repair a core box—and you keep extra core boxes on hand at all times. Duplicast is the ideal core box for high production schedules and for complicated irregular contoured shapes and cavities which otherwise are costly to replace or repair. Duplicast core boxes are made of a wear resistant aluminum alloy by a patented method in which a permanent hob, or mandrel, is used to duplicate any number of core boxes or dryers of exact dimensions within plus or minus .003 inches within a distance of 12 inches. Every Duplicast core box is produced with a mirror-like finish in the cavities without hand finishing or tooling of any kind. Here is the answer to the problem of keeping core boxes in repair.

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PRESIDENT, INDUSTRIAL PATTERN WORKS
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Nonferrous Cleaning Room

(*Continued from page 159*)

ings is reduced. This, plus the combining of certain operations, will help to reduce the time necessary to process castings. For instance, since the core knockout operator must handle each gate of castings, why is it not possible for him to sort the different items? Carrying this idea further, it is possible to process castings through the cleaning room the same day they are cast.

Naturally, such items as navy orders disrupt the sequence of cleaning room operations since these castings must be kept separated by heat numbers pending release by the navy inspector. For such work, adequate cleaning room space must be provided to assure proper storage and easy identification of orders requiring test bar approval.

While the punch press can combine cut-off and grinding operations, most castings are either too large or too complex to be pushed through a die. For such work the sprue cutter or the band saw is employed. The sprue cutter consists of an electrically driven flywheel from which energy is transmitted through a cam and an eccentric to a knife edge. The runner is placed on a knife-edge anvil and is cut as the upper knife descends. The band saw provides a range of cutting speed for adjustments to the size of cut and composition of the material.

A free flow of gates to the saw, and a convenient method of getting the castings away from that work station, is a must, otherwise excessive labor in handling the material will prove costly. The saw will follow the outline of a casting with just one pass, and eliminating the second pass to remove a riser is a cost saving. Cutting speeds for such compositions as silicon bronze, manganese bronze and aluminum permanent mold castings are low, and are used with a heavy feeding pressure to prolong tool life. However, if a smooth finish is important it is advisable to use a fine-pitch saw, high velocity and a light feeding force.

Thin, abrasive cut-off wheels offer another method for cutting through metallic materials quickly. These wheels are made in various thicknesses and diameters for all types of work, and are capable of operating at speeds ranging from 9000 to 16,000 sfpm depending upon the material being cut and the quality of the machine being used.

As a rule, the fastest cutting can be obtained by using a coarse, hard wheel; however, this type of wheel leaves burrs and will generate enough heat to discolor the metal. For a good finish, a softer and finer wheel generally is used. When possible it is advisable to use as coarse a grit and as hard a grade as operating conditions permit. This will assure maximum wheel life and the best overall efficiency. For brass and bronze work a resin-bonded, medium grain size, silicon carbide or alundum wheel having a hard, open structure seems to give good results.

After cutting off the gate as near as possible to the casting, the remaining excess metal must be removed. Unlike the precision grinder whose machine and work movements are fixed, and whose degree of metal removal can easily be standardized, the snag grinder's efficiency is wholly influenced by the operator's judgment. The floor stand grinder, usually a wheel spindle connected to a power source at its center, has a grinding wheel attached to each overhanging end. The rough grinding wheels may be supplemented by two finish grinding wheels, all on the same spindle. The operator thus rough and finish grinds a casting by moving from one wheel to the other.

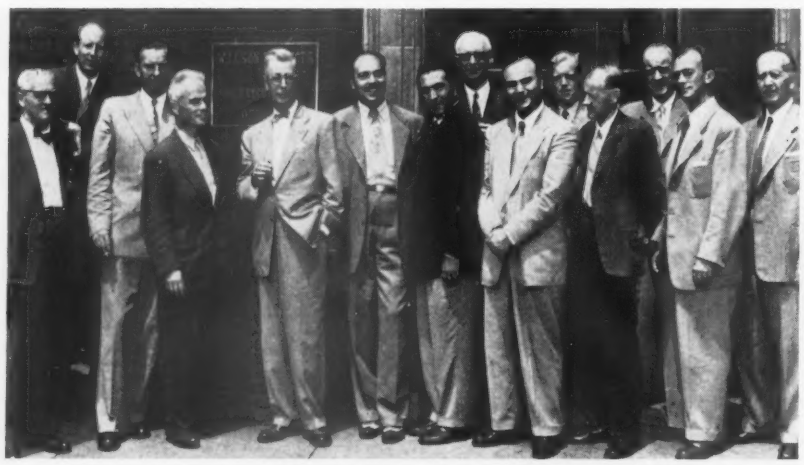
The rough wheel for brass and bronze usually varies from 14 to 36 in. in diameter and can be either vitrified or resinoid bonded. The former has an upper limit of 6500 sfpm; the latter 9500 sfpm.

Factors Influence Efficiency

Grinding efficiency is influenced by operator fatigue, which in turn depends upon such conditions as casting size, weight and shape, amount of handling required, work movements necessary, and machine vibrations. Since the floor stand grinder requires the operator to take the work to the wheel face, and actually employ body contact to exert in-feed pressures, any machine vibration will be transmitted to the operator. Excessive work contact pressure through use of levers or pressure bars will result in high maintenance cost due to overloaded motor and drives.

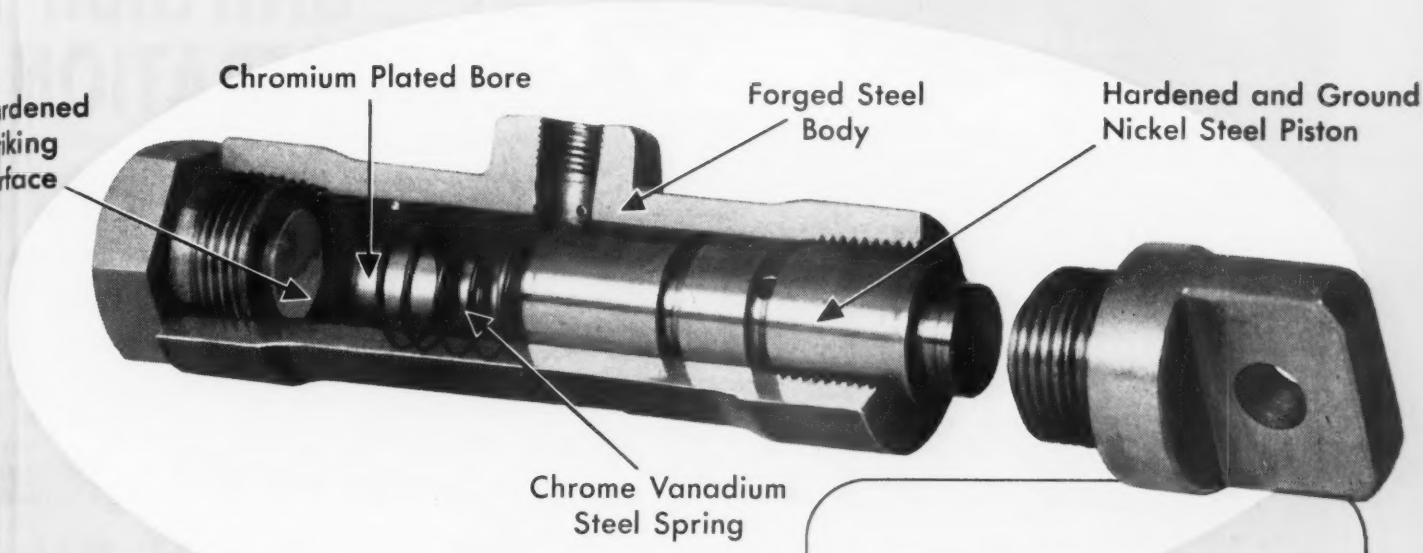
The brass cleaning room, having more or less similar compositions in its castings, does not experience unequal grinding wheel wear from differences in metallurgical formula but rather from differences in operator's techniques and physical makeup. Should unequal wear in wheel diameters occur, proper adjustments can be made on the multi-speed wheel spindle. When a wheel glazes over, the cause is either too hard a wheel or too fine-grained an abrasive. In dressing such a wheel, both productive grinding time and abrasive material is lost. A good operator can perform his own dressing by changing his method and area of grinding on the wheel; similarly, a wheel can be trued if concentrated grinding has grooved it badly. The proper education and supervision of grinder op-

(*Continued on page 278*)



MSA DELEGATES from Turkey and the Scandinavian countries recently visited Willson Products Inc., Reading, Pa., to observe American methods of making industrial safety equipment. The visitors were safety directors and inspectors in their respective countries. Left to right, are: Anders Nielsen, Denmark; Tor Arnevag, Norway; Gregers Koefoed, Denmark; Claf Ruyter, Norway; T. A. Willson, president of Willson Products; J. Perzella, U. S. Department of Labor; F. Altinel, Turkey; E. Dreyer, Denmark; S. Seyhun, Turkey; H. Nielson, Denmark; B. Kristoffersen, Norway; L. Andre, Sweden; A. Malver, Denmark, and M. Pelow, Sweden

OSBORN FOUNDRY VIBRATORS



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- **Greater power in proportion to size.**
- **Long life with chrome plated bore and hardened pistons.**
- **Economical on air consumption.**
- **Greater dependability... more freedom from sticking.**

ABSOLUTE vibrator dependability is vital to continuous efficient mold production. To achieve this result, Osborn has developed this improved design to operate hour after hour, day after day under the severest foundry conditions. Built of the finest quality materials and precision workmanship, Osborn's vibrators provide a low cost insurance for maximum molding machine production. Available from Cleveland stock.

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MATCH PLATE VIBRATORS
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END MOUNTING VIBRATORS
1¼", 2" and 2½"

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When you have a problem—a difficult flask shakeout—an unusual pattern draw, etc., don't use valuable time experimenting—put the problem up to "BRANFORD".

Phone us if necessary and we will gladly help you solve it. Chances are, that although the problem may be new to you, it is similar to one we have already encountered — and licked. So—when in trouble—call the doctor—the "BRANFORD" Foundry Doctor.

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"BRANFORD" Vibrators

NEW HAVEN VIBRATOR COMPANY
131 CHESTNUT ST., NEW HAVEN, CONN.
SPECIALISTS IN PNEUMATIC VIBRATING EQUIPMENT

(*Continued from page* 276)

erators is essential in reducing overall grinding costs.

Where stock removal is light, or where inaccessibility does not allow the operator to remove the excess stock, the portable grinder can be taken to the work. Wheel speeds are those mentioned for the floor grinders whose work it supplements. As a rule, a hard wheel having a low metal removal rate that saves abrasive costs will have a higher labor cost; a soft wheel will have a higher metal removal rate and abrasive cost, but will be lower in labor cost and overhead. Naturally, greater wheel-to-work pressures will increase metal removal, reduce labor cost, but will increase abrasive costs.

Again, excessive handling time can be reduced by use of accessories such as hoists and proper conveying equipment to move the stock easily. The greatest economies can be realized where the wheel contact time is the highest percentage of the overall time—that is, a minimum of interruptions caused by moving the work to and from the operator.

The author, Martin G. Dietl, is foundry production engineer for the Schaible Co., Cincinnati

Pneumatic tools, such as chipping hammers generally are utilized to knock cores out of very large work and to remove fins and ingates in preference to grinding off the excess stock. Sometimes this tool is used to remove areas of heavy metal penetration.

Selection of proper blast cleaning equipment is governed by the initial cost, operating cost, maintenance, necessity for auxiliary equipment or special excavations, and desired finish. Still used in many small foundries is the hexagonal steel tumbler, which can be run either wet or dry.

(*Continued on page* 280)

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Starting point for more efficient foundry operation

1 THE HOUGHTON MAN—Whenever the Houghton Man calls at your plant he's there to help you first of all. He either knows a solution to your foundry's core-making problems or knows where he can get it. He's there to sell the Houghton Line of Hy-Ten Core Oils, of course. But he knows he must *help* you first!

2 HOUGHTON RESEARCH—The right sand and oil combination is one of the factors that result in sound, accurate castings. Houghton research has developed data showing how varying sands work best with certain types of core oils. Laboratory aid like this is yours at any time. Ask for it freely.

FOUNDRYMEN ARE FINDING THEY GET BETTER CORES AND GREATER SATISFACTION WHEN THEY TAKE ADVANTAGE OF HOUGHTON'S 85 YEARS OF EXPERIENCE ALL ALONG THE WAY THROUGH THESE FOUR STEPS

3 HOUGHTON PRODUCTS—One of our cost-cutting core oils will team up with your production perfectly—or we'll develop a formula that will! The rigidly-controlled uniformity and built-in merits of all Hy-Ten Core Oils make it possible to produce better work with fewer rejects regardless of baking temperature used.

4 HOUGHTON "KNOW-HOW"—Long experience enables our foundry-minded staff to check your core-room procedure. This know-how stems from three generations of accumulated experience, down to today's greater choice of available raw materials. Why not standardize on Hy-Ten in *your* foundry?

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Names Like These Are Making News In ALABAMA

New plants, manufacturing a wide diversity of products, are streaming into Alabama. They came to manufacture more advantageously and to serve better the South's growing markets. Last year private capital investment in new factories in this State broke all records. Established industries are spending millions for expansion to meet increased demands. Here are names you know that are helping speed Alabama's widespread industrial development.

A FEW OF ALABAMA'S MANY NEW PLANTS

Where They Located — What They Make

WESTINGHOUSE ELECTRIC CORP.
Reform—*Electric Lamps*

THE CHEMSTRAND CORPORATION
Decatur—*Synthetic Textile Fibers*

COURTAULDS of "ALABAMA," Inc.
Salco—*Textiles*

MATHIESON-ALA. CHEMICAL CORP.
McIntosh—*Chemicals*

GENERAL ELECTRIC COMPANY
Oxford—*Electronic Tubes*

BEAUNIT MILLS, Inc.
Childersburg—*Rayon*

BORDEN METALS PRODUCTS CO.
Leeds—*Steel Gratings*

HAYES AIRCRAFT COMPANY
Birmingham—*Aircraft Modification*

APPLETON ELECTRIC COMPANY
Trussville—*Electric Fittings*

CONTINENTAL CAN COMPANY
Fairfield—*Tin Plate Sheet Processing*

AMERICAN SMELTING & REFINING COMPANY
Federated Metals Division
Birmingham—*Non-ferrous Metals Refining*

BORDEN COMPANY
Demopolis—*Formaldehyde and Synthetic Resins*

ALLIED CHEMICAL & DYE CORP.
Barrett Division
Birmingham—*Roofing and Siding*

ESSEX WIRE CORPORATION
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WHITTEMORE CORPORATION
Fayette—*Shoe Polish*

BUTLER MANUFACTURING CO.
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THE ENGLANDER COMPANY
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Atmore and Demopolis—*Lingerie*

GENERAL AMERICAN TRANS. CORP.
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GERRARD STEEL STRAPPING CO.
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RIEGEL TEXTILE CORPORATION
Greenville—*Work Gloves*

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A. V. Wiebel
President
Tennessee Coal & Iron Div.
United States Steel Co.

(*Continued from page* 278)

However, neither method produces a surface sufficiently clean for subsequent machining or plating, but rather one of a decorative nature. Obviously, this equipment has a low initial cost, but a high operating cost due to its limited capacity.

Whenever sufficient compressed air is available, the sand blast machine can be used to clean castings. This type of machine comes in several sizes to accommodate various quantities of work. Coarse sand is the usual abrasive material because it is not hard enough to become imbedded in the relatively soft brass and cause discoloration.

Another method of cleaning castings is the airless or centrifugal type blast unit employing a tumbling barrel or rotating table to present the work to the abrasive stream.

The airless blast unit is designed in many variations to handle all types of castings; also it can incorporate belt conveyors for continuous operation. In using this equipment the brass and bronze cleaning room foreman generally prefers a malleable type abrasive to obtain the desired casting finish and minimize equipment wear.

Castings Processed Same Day

In the foundry division of the Schaible Co., producing daily upward of 3000 molds into which between 50,000 to 60,000 lb of red brass are poured, a high degree of mechanization is carried through to the cleaning room so that the castings are processed there the same day they are poured. The cleaning room operation actually begins in the pattern shop and is followed up by exacting controls in coremaking, molding and melting, together with proper job education and good supervision in the cleaning room.

After pouring and cooling the molds are taken off either of two power mold conveyors and shaken out on an oscillating conveyor. Care was taken in installing the several oscillating conveyors to minimize the casting drop so as to prevent distortion of 8 in. faucet bodies. Sand and castings are moved automatically to an airless blast table (Fig. 2) where the gated castings are removed from the conveyor and placed on the revolving table for blasting.

Sand falls through the grating of the oscillating conveyor onto a rubber belt and moves over a magnetic pulley and vibrating screen to a storage hopper. The table-blast operator removes the cleaned castings and

(*Continued on page* 284)

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One hundred million chaplets in Cleveland Stock of standard sizes and many specials to meet your immediate and ever changing needs.

Large jobber stocks strategically located make available to you standard or special stocks for immediate nearby delivery. Be sure to specify Fanner chaplets when ordering from your nearby jobber.

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3

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Fanner's complete line of chills includes Chill Coil Nails, Chill Coils, Spider Chills, Super Chills, Radius Chills, Ram-Up Chills and many special types.

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Modern, sturdy packaging for your protection and convenience. Packaged in barrels, kegs or in three new carton sizes, ideal for palletizing and efficient stock keeping.

5

To Assure You Quality Products & Service

Attention to production detail by employees with many years of experience on specially designed machines. Pride of craftsmanship assures precision tolerances and superior quality.

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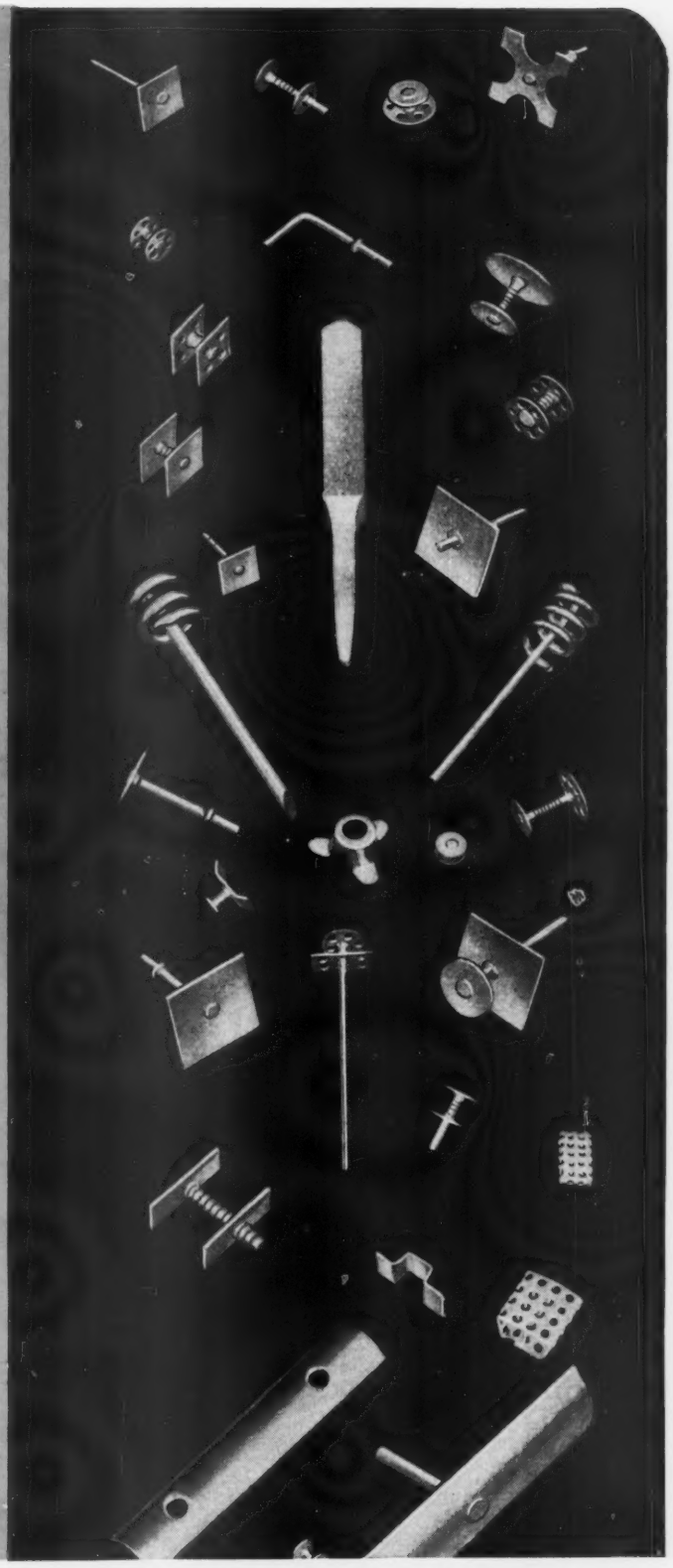
Attention to Order Service Detail by a competently trained staff assures you of unusual service even on the smallest order.



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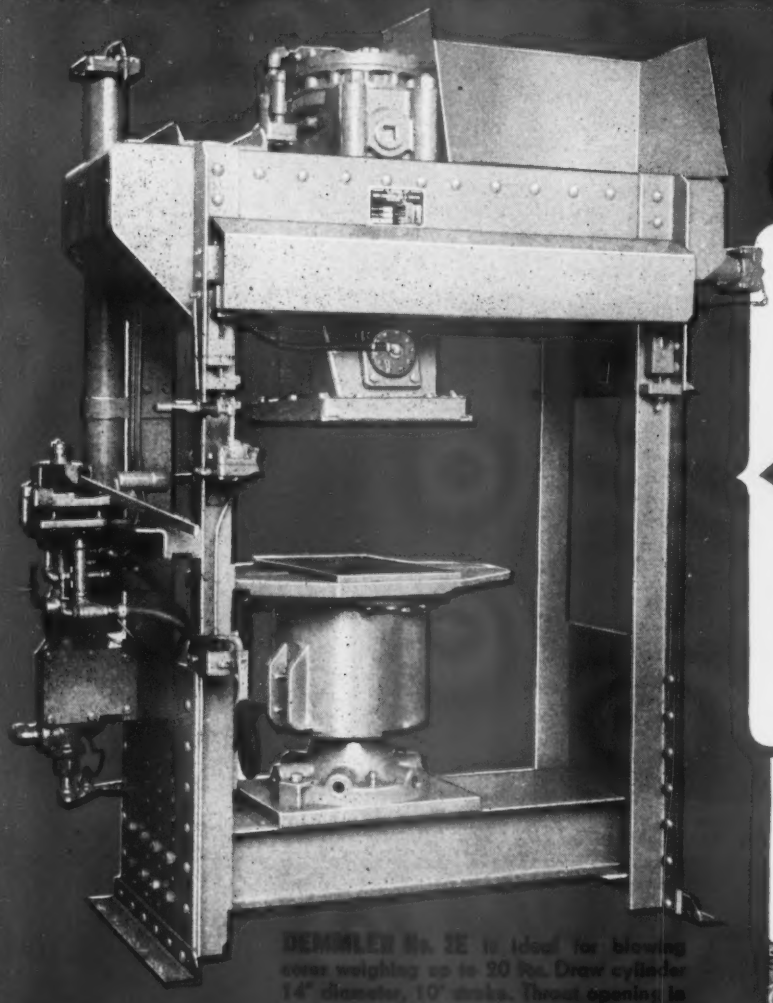
32

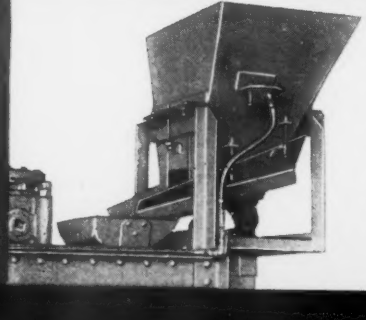
DEMMLER CORE BLOWERS



Better 8 Ways

1. Ultra high speed blow valve action — increasing initial blow pressure 25% above other machines.
2. Magazine exhaust valve — extra large size — quick acting — immediately exhausts air from magazine after core is blown.
3. Carriage rails — on outside of machine frame — out of sand area — where drawing accuracy would be impaired.
4. Leveling adjustment — 4 screw adjustment for complete adjustment of core box to draw — EASILY ACCESSIBLE.
5. Completely enclosed drawing post — drawing accuracy within thousandths — protected from sand and abrasion — assuring long, trouble-free life.
6. 2 speed hydraulic draw control — low speed while vibrator is acting and quick drop after core is drawn.
7. Hard, chrome plated valve seats—insure against rust and deterioration.
8. All parts of machine easily accessible for low maintenance costs.

DEMMLER No. 2E is ideal for blowing cores weighing up to 20 lbs. Draw cylinder 14" diameter, 10" stroke. Throat opening to carriage 7" diameter.



DEMMLER Vibratory Sand Feeders increase core blower production as much as 25%! Sand stored in large hopper flows like water while vibrators are operating. Powered by rotary type pneumatic vibrators. Ends poking sand nuisance!

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Help speed *Studebaker* production

The efficient manner in which Studebaker doubled capacity of their foundry is a well known story to the trade today.

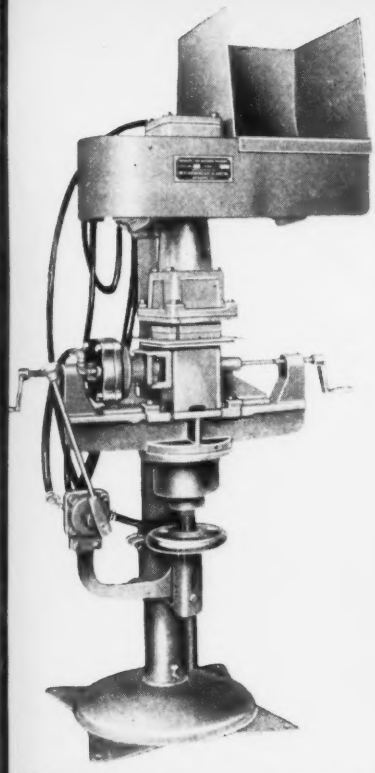
It pays tribute to the alert minds and capable hands for which the South Bend plant has long been known.

We at DEMMLER are gratified that these progressive Studebaker people have come to depend to a large extent on DEMMLER core blowers for their enviable record of fast, economical production of quality cores.

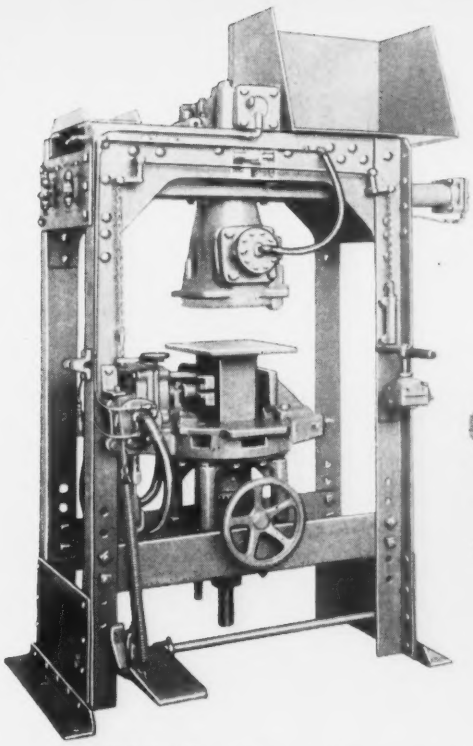
Thirty two DEMMLER core blowers are now in service at Studebaker!

Foundries everywhere have found that DEMMLER core blowers, because of their many outstanding features, are the wisest core blower investment on the market today!

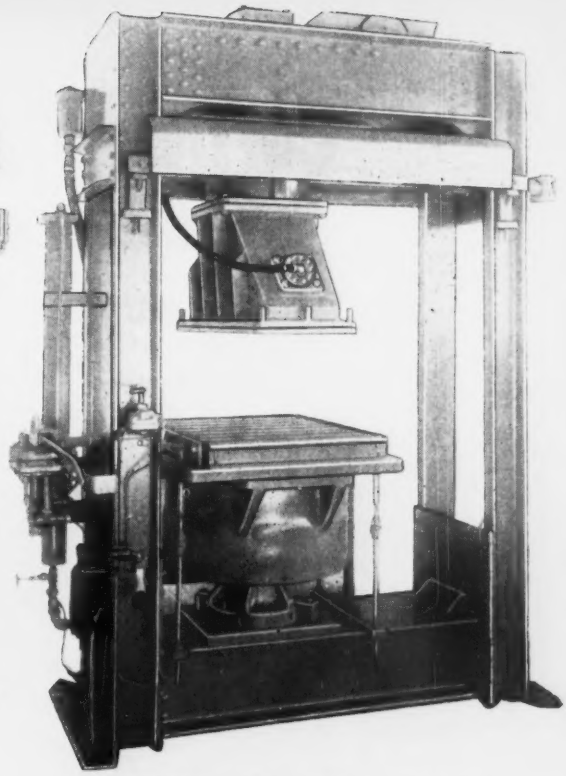
That's because DEMMLER core blowers—and only DEMMLER Core Blowers — offer you all eight of the important design features by which core blower value is determined.



DEMMLER No. 55 provides answer to fast, economical production on short run jobs! One hand valve operates both vertical and horizontal core box clamps. Capacity, cores weighing up to 5 lbs.



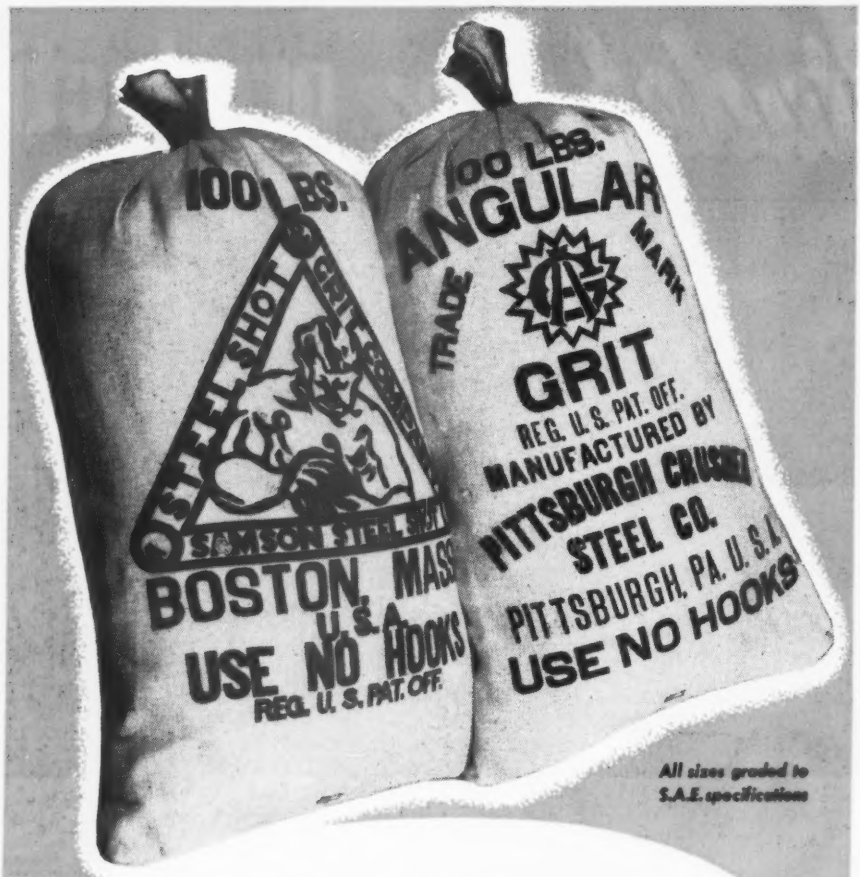
DEMMLER No. 1 is general purpose machine. Vertical clamping diaphragm, 10½" diameter. Capacity, 8 to 10 pound cores. One of the most popular core blowers ever built.



DEMMLER No. 4E handles cores weighing from 35 to 250 lbs. and up in weight. Draw cylinder 20", 22" or 26" diameter, 10" stroke. Throat opening in carriage 13" diameter.

Wm. DEMMLER & BROS., Kewanee, Illinois

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911



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clean more castings per dollar!

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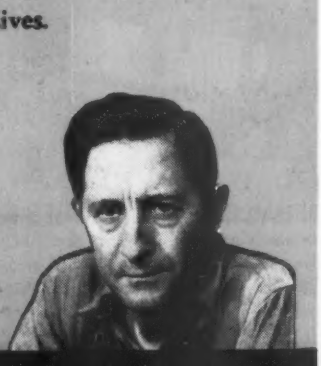


PITTSBURGH CRUSHED STEEL CO., Pittsburgh, Pa.
STEEL SHOT AND GRIT CO., Boston, Mass.
MEMBER FEMA

(*Continued from page* 280)

hooks them on a chain conveyor traveling to the cleaning room. While the chain remains in motion, the core knockout operator removes the core sand (Fig 3) and separates navy work from the high-pressure castings and plumbing brass goods. This is readily accomplished by proper tagging and identification of the work at the shakeout.

Navy castings are piled according to heat numbers on skids The high-pressure work is placed on a roller conveyor which momentarily acts as a bank of castings for the cut-off machine. The operator of this machine, using a reinforced alundum wheel, cuts the castings off the gates and scoops them into a tote box on a roller conveyor (Fig. 3). The filled box moves along to the floor stand grinders (Fig. 5). The grinder, handling each casting separately, is in a position to remove scrap parts from the good castings. The grinders are equipped with both rough grinding and finish grinding wheels, permitting a cleaned casting to be produced with a minimum of handling.

Segregates Different Items

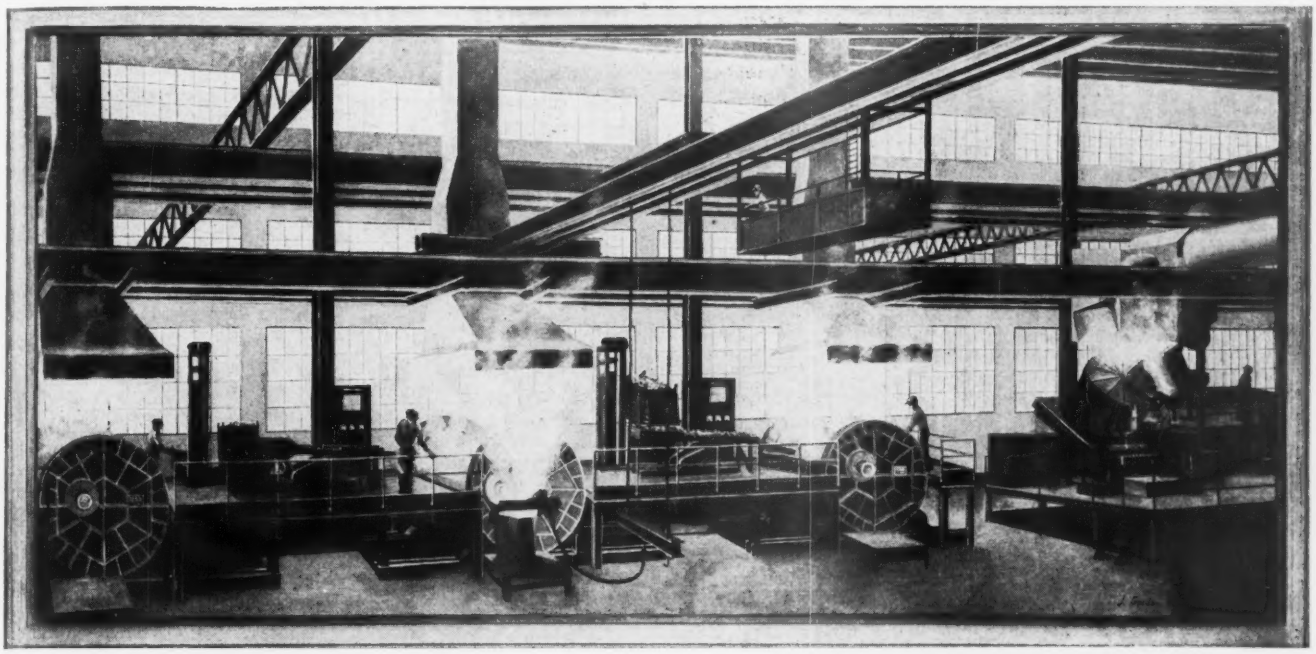
Plumbing brass goods and light-pressure castings are replaced on the chain conveyor after core knockout and carried to the sprue cutter (Fig. 4). The latter operator trims the castings from the gates and funnels them through chutes to one to six grinders. Assigning certain castings to each sprue cutter segregates different items at the floor stand grinder. This automatic separation again reduces handling time. Sprue and gates are dropped onto an oscillating conveyor to be dumped into a furnace charging bucket. Each grinder rough and finish grinds his castings; also, as mentioned before, he sorts and discards the scrap.

Good castings are placed in a two-wheel dump truck by the grinder, and are wheeled and dumped into the receiving hopper of the airless blast barrel (Fig. 7). Since this is a batch operation, the blast operator wheels the load from the grinder to his machine. After blasting the castings are dumped into shipping boxes resting on a roller conveyor. One section of this conveyor is attached to a scale so that the load is weighed and counted automatically.

In modernizing cleaning room operations, it may well pay to speculate on new molding processes that will undoubtedly influence cleaning room functions. The author's experience with shell molding indicates that

(*Concluded on page* 286)

AJAX Induction Melting Furnaces— A Modern Tool for Industry



This oil painting, 9 feet long in full color, by J. Gordon White, shows AJAX-SCOMET installation at Scovill Manufacturing Company, Waterbury, Connecticut

Here is a new tool for melting metal . . . Something that can concentrate enormous power in a small space . . . Something that can be adapted to accurate pouring, to precise temperature control, to inert gas protection, to high-grade refractories . . . A tool that can be used for all existing non-ferrous metals and alloys.

AJAX furnaces paved the way for continuous casting processes which lay dormant in old patents of farsighted inventors who thought ahead of their times. Junghans, with the help of the AJAX furnace, developed his continuous casting process at the Wieland Works in Germany before the last World War.

Scovill perfected the Junghans process in this country and is using AJAX-SCOMET furnaces of unprecedented size for melting, as shown in painting above. Nichols Wire & Aluminum Company used the first commercial Properzi machine for continuous production of aluminum wire from molten metal delivered by AJAX furnaces; U. S. Metals Refining Company is using AJAX-SCOMET furnaces for continuous casting of oxygen-free copper. Cleveland Graphite Bronze Company produce their famous stock for steel backed copper-lead bearings exclusively in AJAX melting furnaces. AJAX furnaces are used in many plants and research laboratories for continuous bonding aluminum to steel.

AJAX made the first furnace for galvanizing steel in a refractory lining with accurate temperature control. AJAX furnaces were instrumental in the realization of modern squirrel-cage aluminum rotor production. AJAX supplied the first commercial automatic pouring device for die-casting machines.

These few examples show how AJAX induction furnaces can be applied to modern manufacturing methods. Write us for further information.

AJAX TAMA-WYATT

AJAX ENGINEERING CORP., TRENTON 7, N. J.

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AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
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CLEVELAND 3, OHIO

2520 West Lake Street
CHICAGO 12, ILLINIOS

(*Concluded from page* 284)

a cost saving in the cleaning operation can be realized totally apart from the production increase in the foundry. Shell molding with its relatively high yield through the use of smaller risers and gates will reduce sprue cutting and gate grinding time. Some castings can be molded differently from what is general practice in sand molding so that parting line fins are eliminated, while the ready peel of the resin sand produces a finish that minimizes the need for blast cleaning.

Special Training Given In Quality Control

Educational committee of Central Indiana Chapter of the American Foundrymen's Society sponsored a special training program in statistical quality control, Feb. 21-23. Purpose of the conference sessions was to demonstrate the practical use and interpretation of statistical quality control methods.

ALLEN A. EVANS

Allen A. Evans, foundry quality control engineer, International Harvester Co., Indianapolis Works, was the conference leader. Included in the conference was a trip through International's foundry to observe application of control methods.

Inspection Laboratories Service Small Plants

Because of increasing military contract and subcontract work, with many government contracts specifying nondestructive inspection and testing of parts produced, Magnaflux Corp., 5900 Northwest Highway, Chicago 31, has increased the national coverage of its commercial laboratories from five to eleven locations. These laboratories offer inspection of parts from one to 1 million and field inspection for large objects.

Laboratories now are located in Chicago, New York, Cleveland, Detroit, Los Angeles, Oakland, Calif., Hartford, Conn., Wichita, Kans., and Dallas, Houston and Odessa, Tex. Inspection service is in addition to the regular manufacture and sale of company inspection equipment and includes consultation with experienced company personnel.

Arcair

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Many foundries are saving hundreds of cleaning room man hours with this

NEW GOUGING PROCESS HAVE YOU seen it?

It is ECONOMICAL TO OPERATE. Uses only compressed air and electrodes. EASY TO USE. Any welder can learn in a few minutes and become proficient in a few days. AIR COOLED for comfort of operator. VERSATILE. Can be used wherever you can weld, and the same man prepares tee-joint that welds it. CUTS CLEAN. No further preparations necessary for welding.

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MIT To Conduct Course On Molding Materials

Developments in two phases of metallurgy will be offered as part of the 1952 summer session at Massachusetts Institute of Technology. Program from June 9-13 will cover surface reactions in flotation. Program from Sept. 1-6, in chemistry and mechanics of molding materials, will be given under the direction of Dr. Howard F. Taylor of the Department of Metallurgy.

Latter program is designed to provide a fundamental appreciation of refractories and binders of both current and potential use in the foundry industry. Topics will include origin, types, location, mining and separation of sands, clays and refractories for foundry uses; physical properties and characteristics currently measured; chemical compositions of materials; bonding action of binders, and physicochemical characteristics under various conditions.

Requests for application forms or further information should be addressed to Dr. Ernest H. Huntress, director of the summer session, Room 3-107, Massachusetts Institute of Technology, Cambridge 39, Mass.

Bureau of Apprenticeship Issues Annual Report

Activities of the Bureau of Apprenticeship, U. S. Department of Labor, are summarized in its 1951 annual report. During the fiscal year ending June 30, 1951, the bureau's activities were directed primarily toward alleviating the manpower shortage in defense production industries. To do this, services were expanded to assist defense production plants, schools, government employment services, and other agencies and groups in apprenticeship and other forms of training programs and in worker recruitment.

A section of the report discusses efforts to attract apprentices to the foundry industry, which the bureau recognizes as being one of the most essential in defense production.

Holds FEF Student Dinner

A dinner, sponsored Mar. 14 at Purdue University, West Lafayette, Ind., by the school's Foundry Educational Foundation industry advisory committee, honored students interested in the foundry industry and the School of Engineering officials. Following the dinner, George K. Dreher, executive director of the foundation, was introduced

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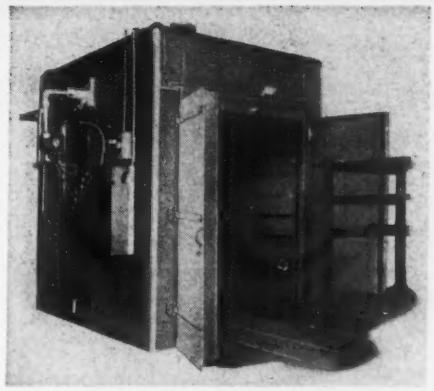

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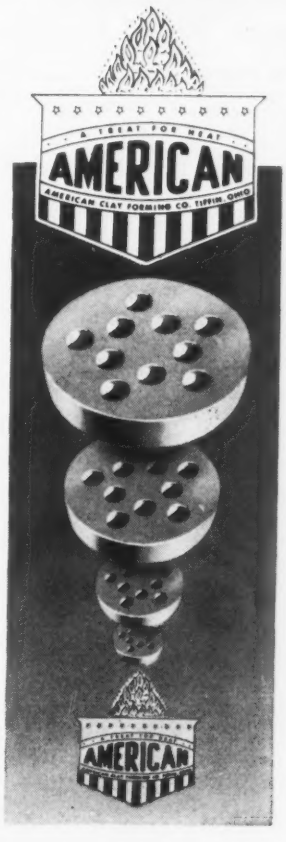

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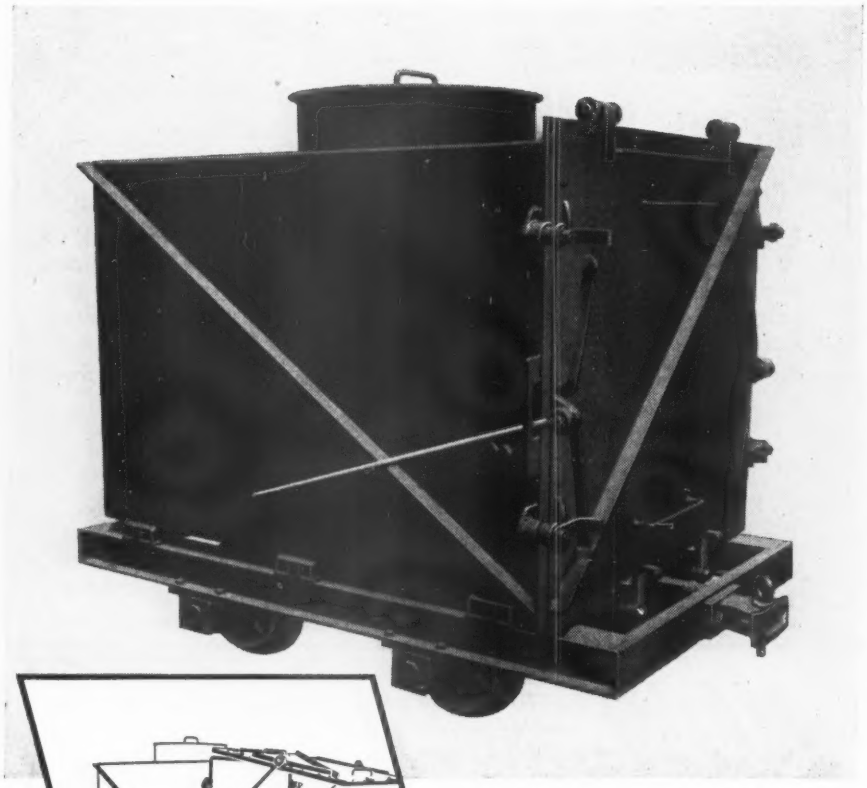

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by Fred Carl, Fabricast Division, General Motors Corp., Bedford, Ind., chairman of the Purdue FEF advisory committee. Mr. Dreher described the opportunities for foundry engineers in the industry today.

Dean A. A. Potter, Purdue, spoke of the importance of the foundry industry and presented a certificate in behalf of the FEF and the university to Paul Harlan, Electric Steel Castings Co., Indianapolis. Dean Potter expressed appreciation to Mr. Harlan for his efforts in modernizing the Purdue foundry.

Guest speaker was Barney C. Yearley, National Malleable & Steel Castings Co., Chicago, who discussed engineering opportunities in the cast metals industry. He stressed importance of mold design, heat transfer, metallurgical analysis, materials handling and plant layouts from the engineering aspect.

Book Review

Fundamentals of Supervision, by Charles F. Harad, cloth, 224 pages, 7½ x 10¼ in., published by Delmar Publishers Inc., Albany, N. Y. Price $5. *Conference Leader's Guide to Fundamentals of Supervision*, 80 pages, spiral bound, $2.

This industrial supervisory training course presents in short, complete units the fundamentals of successful supervision. Text is divided into three major sections: The Supervisor Learns About His Company; About Himself; About His Fellow Workers. Units of the course can be adapted to fit a local training need. Practical case problems are included in each unit to provide applications of the principles discussed.

The *Conference Leader's Guide* is intended for use by the training officer or conference leader conducting the training program. It contains an itemized plan for conducting conferences and for leading group participation on each of the supervisory instructional units covered in the text.

IBF To Hold Conference

The Institute of British Foundrymen will hold its 49th annual conference at Buxton, Derbyshire, June 10-13. All conference meetings will be held at the Spa Hotel and most social functions at the Palace Hotel. The last day of the conference will be devoted to plant visitations in Sheffield.

The conference is organized by the Sheffield and District Branch of the institute. Dr. C. J. Dadswell, a past president of that branch, will be installed as president of the institute at the conference.

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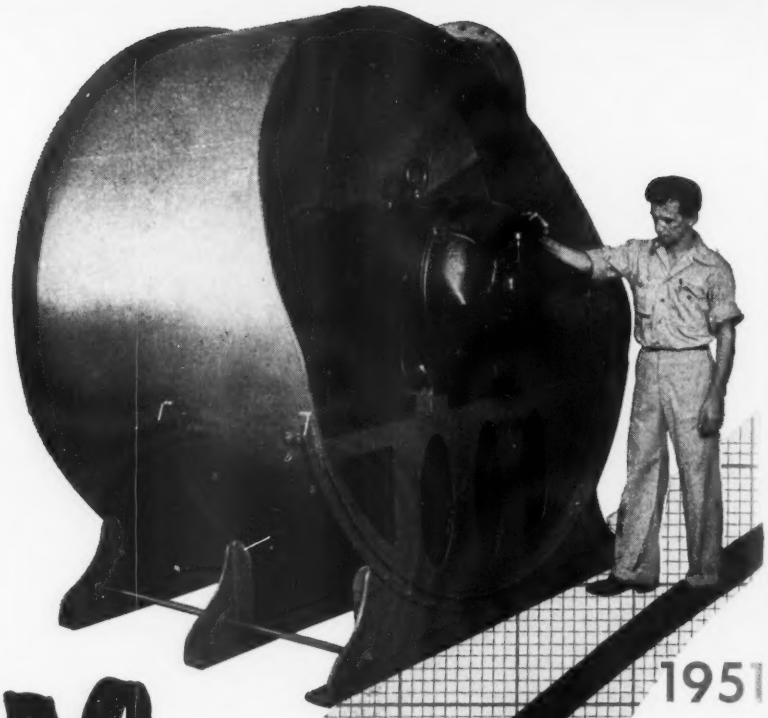

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Casting Steel Spokes In Large Iron Wheels

ABC of Foundry Practice

By PAT DWYER, *Engineering Editor, FOUNDRY*

THE following questions recently were submitted by a foreign foundryman regarding American foundry practice in making bandsaw wheels 5 to 8 ft diameter, with cast iron rim and hub connected by wrought iron spokes:

1—What time should elapse between casting rim and hub? 2—What is the best shape for the ends of the spokes? 3—Should the spoke ends be coated with tin? 4—Is the hub formed in molding sand, or in a dry sand core assembly? 5—Is it necessary to pour the rim and hub with alloy iron? 6—Is it absolutely necessary to use Norwegian iron for the spokes? The wheels operate under radial tension of 22,000 to 26,000 lb and at a speed of 600 to 700 rpm.

Taking these questions in the order of presentation, the following brief comment outlines the practice in American foundries where wheels of various kinds with cast iron rims and hubs and steel spokes are cast.

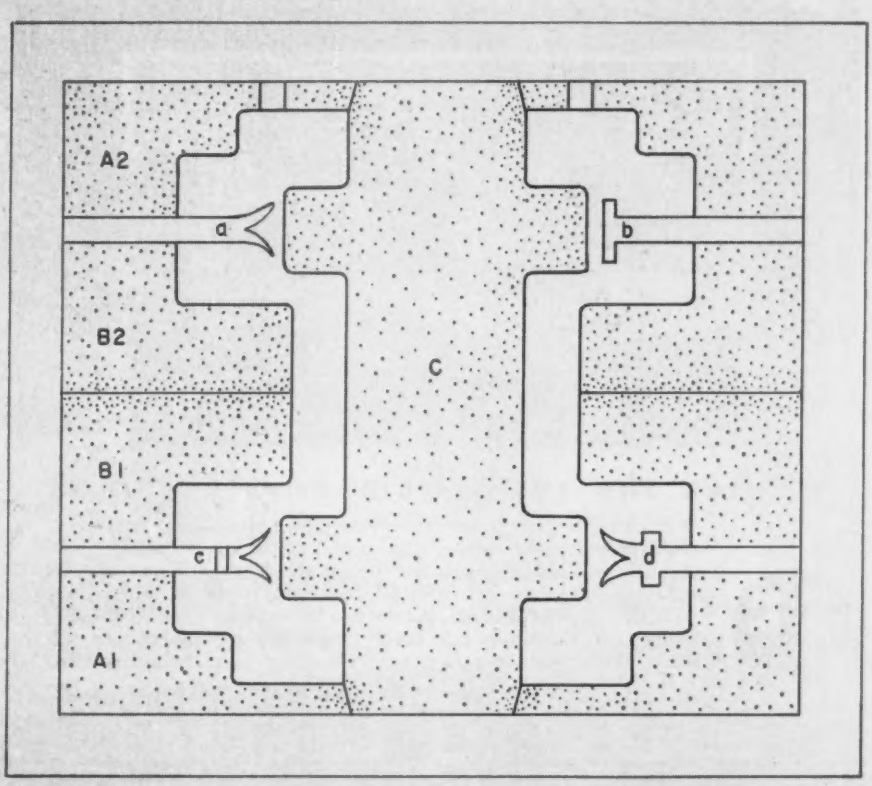
1—The time limit between casting the rim and the hub depends on the time required for the rim to come down to room temperature. In an emergency, the rim may be stripped and cooled artificially by water or air spray, but this rarely is necessary. In ordinary practice the rim is poured one day and the hub is poured the following day. That period permits the rim to cool and contract in a normal manner. The reason for pouring the rim first and allowing it to cool, is because the rim contracts to a greater degree than the hub. With this contraction taken care of, the contraction of the hub merely puts a slight tension on the spokes.

2—So far as we know, no standard or best method has been adopted for shaping the ends of the spokes to insure a tight, solid grip. Four of the many methods are shown in the accompanying illustration. A plain split and spread is shown at *a*. A spoke with the end upset, square or round, in a bolt heading machine is shown at *b*. In addition to a split end, the spoke end shown at *c* has a drilled hole. The spoke at *d* has a split end and a collar formed in a die or under a drop hammer. For additional security many foundrymen nick the affected part of the spoke with a hammer and chisel.

3—The most essential feature in promoting a tight grip between the cast metal and the spoke end is to treat the spoke end in a manner that will prevent disturbance of any kind while the metal is surrounding it. This part of the spoke must be perfectly clean and perfectly dry. A slight film of oxide (rust) or dampness will cause the molten metal to flutter violently, cool rapidly, and fail to grip the spoke tightly. The end of the spoke is cleaned by sand or shot blasting and then dipped into a tin bath. This is recognized as the most satisfactory coating material for the purpose. However, if a tin bath is not available, several other materials may be employed with fairly satisfactory results; for example, red lead, shellac, machine oil, chalk or water glass (sodium or potassium silicate). Irrespective of what medium is employed the basic factor remains the same—the metal surface must be perfectly clean.

4—Method of forming the hub mold in a core assembly is shown in the accompanying illustration, a sketch not drawn to scale. The assembly includes five units—top and bottom *A*1 and *A*2, intermediate parts *B*1 and *B*2 and center core *C*. One corebox serves for *B*1 and *B*2. A second corebox serves for *A*1 and *A*2. Since the spokes would prevent assembling the cores on the second day, they are placed in position at the same time the mold for the rim is prepared. The cores are assembled on a board or plate in a hollow place in the center of the mold.

Since the spokes enter the hub at two levels and enter the rim at a uniform central level, it is necessary to adjust the hub cores so that the dividing line between core *B*1 and core *B*2 is in line with the center line of the rim. Position of the bottom board or bottom plate is determined by measurement, or by setting the plate or board at approximately the proper distance below the joint line of the mold. Cores *A*1 and *B*1 are placed on the board and wedged up until the upper face of core *B*1 coincides with the joint line. This readily is accomplished by laying a straight edge across the top. Core *B*1 is re-



Showing four methods for anchoring steel spoke ends in cast iron hub

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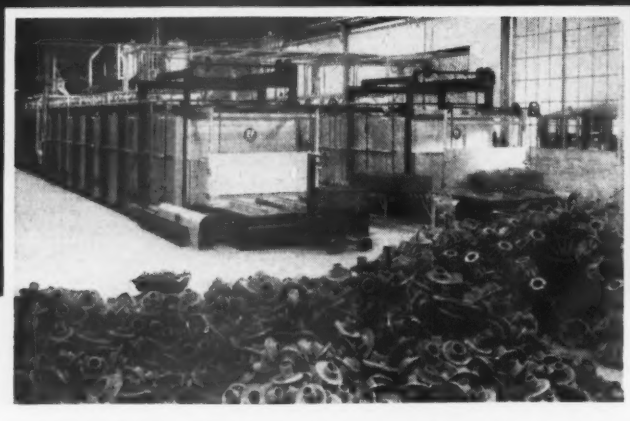

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moved temporarily and core *A*1 is carefully checked for center position. The first set of spokes is placed in position and the center core *C* is set in place. On account of the chamber on the core *C*, the core *B*1 and later the core *B*2 must be split in two vertically. After the upper spokes are placed in the grooves in core *B*1 the top core *A*2 with opening for sprue and riser is placed in position.

The assembly is clamped and surrounded by rammed sand. To compensate for any minor ebullition while the mold is filling with metal, it is advisable to *flow* a certain amount of metal through the riser. The amount is a matter of judgment and depends on the manner in which the first iron flows through.

5—Is it absolutely necessary to employ alloy iron for the rim and hub? The answer to this must be a compromise in that while it is not absolutely necessary, it may be advisable to do so. A cupola mixture producing iron with a tensile strength of 35,000 psi will serve satisfactorily in these wheels. With 25 to 30 per cent steel in the cupola charge the metal in the casting will conform to the following approximate analysis: Total carbon 3.25 per cent; silicon 1.75 per cent; manganese 0.70 per cent; sulphur 0.06; phosphorus 0.40 per cent. The metal should be melted and poured fast and hot.

6—So far as strength is concerned, steel spokes serve satisfactorily in small and large wheels. Norwegian and other examples of wrought iron are highly resistant to corrosion and for that reason find favor in applications where corrosion is a problem. Corrosion is not an important factor in the operation of a bandsaw wheel. The practically universal practice in American foundries is to use steel spokes.

Book Review

Basic Blueprint Reading and Sketching, by C. Thomas Olivo and Albert V. Payne, paper, plastic spiral bound, 162 pages, 7¾ x 10¼ in., published by Delmar Publishers Inc., Albany, N. Y. Price $2.25. Clothbound edition for $3.40.

Objective of this book is to provide instruction for those who must develop ability to read and interpret blueprints and make shop sketches without the use of drawing instruments. Each unit of instruction is organized as follows: Specific objectives are outlined; principle under discussion is explained and illustrated; application of the principle is shown in actual blueprint, and a carefully worked out assignment is included to test for mastery of the text.

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Activities of Foundry

GROUPS

Rochester

PATTERNMAKERS' Night, an annual occasion of the Rochester Chapter of AFS, was held Mar. 4 at Hotel Seneca. Of the 71 persons present, 35 were patternmakers. The meeting included a brief talk by George K. Dreher, executive director of the Foundry Educational Foundation. The color film produced by Archer-Daniels-Midland Co. was then shown by Andy Coulter. This motion picture covered coreroom problems and how to cure them by proper blending of sand, oil and cereal binder and water.

Guy A. Pealer, pattern superintendent of General Electric Co., foundry, Elmira, N. Y., was the principal speaker. Mr. Pealer traced patternmaking and molding from the 14th century to the present. A patternmaker to be of help to industry must be an engineer and not just a "wood butcher." With proper engineering he can save industry many dollars in purchasing castings as well as machining them. With illustrations, he showed the cheapest pattern is not always the one lowest in cost and that the patternmaker who is a pattern engineer will suggest and show pattern buyers how to save money in purchasing castings.

In conclusion, Mr. Pealer showed the General Electric moving picture, "World's Largest Work Shop," depicting how GE employs the best of engineering to produce patterns, castings and finished products.—*Herbert G. Stellwagen, Hetzler Foundries Inc.*

Eastern New York

SPECIAL guest at the Mar. 18 meeting of Eastern New York Chapter of the AFS was Lloyd Wright, U. S. Radiator Corp., Geneva, N. Y., and a national director of the AFS, who reported on the new home for national AFS headquarters and other activities of the society.

Technical speaker was C. A. Robeck, Gibson & Kirk Co., Baltimore, whose topic was "Nonferrous Foundry Practice." Mr. Robeck outlined: Melting, with emphasis on recording performances and assimilation of melting and remelt data molding, in which pattern information and sand behavior are of chief importance; core-making, emphasizing the need for accurate measurement of component ingredients; and cleaning, which requires co-operation in analyzing and correcting defects.

Considerable interest was evidenced

(*Continued on page* 298)

EASTERN NEW YORK Chapter of the AFS celebrated international night Mar. 18. At top is a general view of the meeting. Speakers' table is shown at bottom. Left to right, are: Lyman C. Thunfors, Rensselaer Valve Co., chapter director; Lloyd Wright, National Radiator Co., National AFS director; C. A. Robeck, Gibson & Kirk Co., principal speaker; Leigh Townley, Adirondack Foundries & Steel Inc., chapter vice chairman; John E. Waugh, General Electric Co., chapter chairman; Paul Wilson, Hunter Machine Co., chapter director, and William Stevenson, Rensselaer Valve Co., chairman of the membership committee

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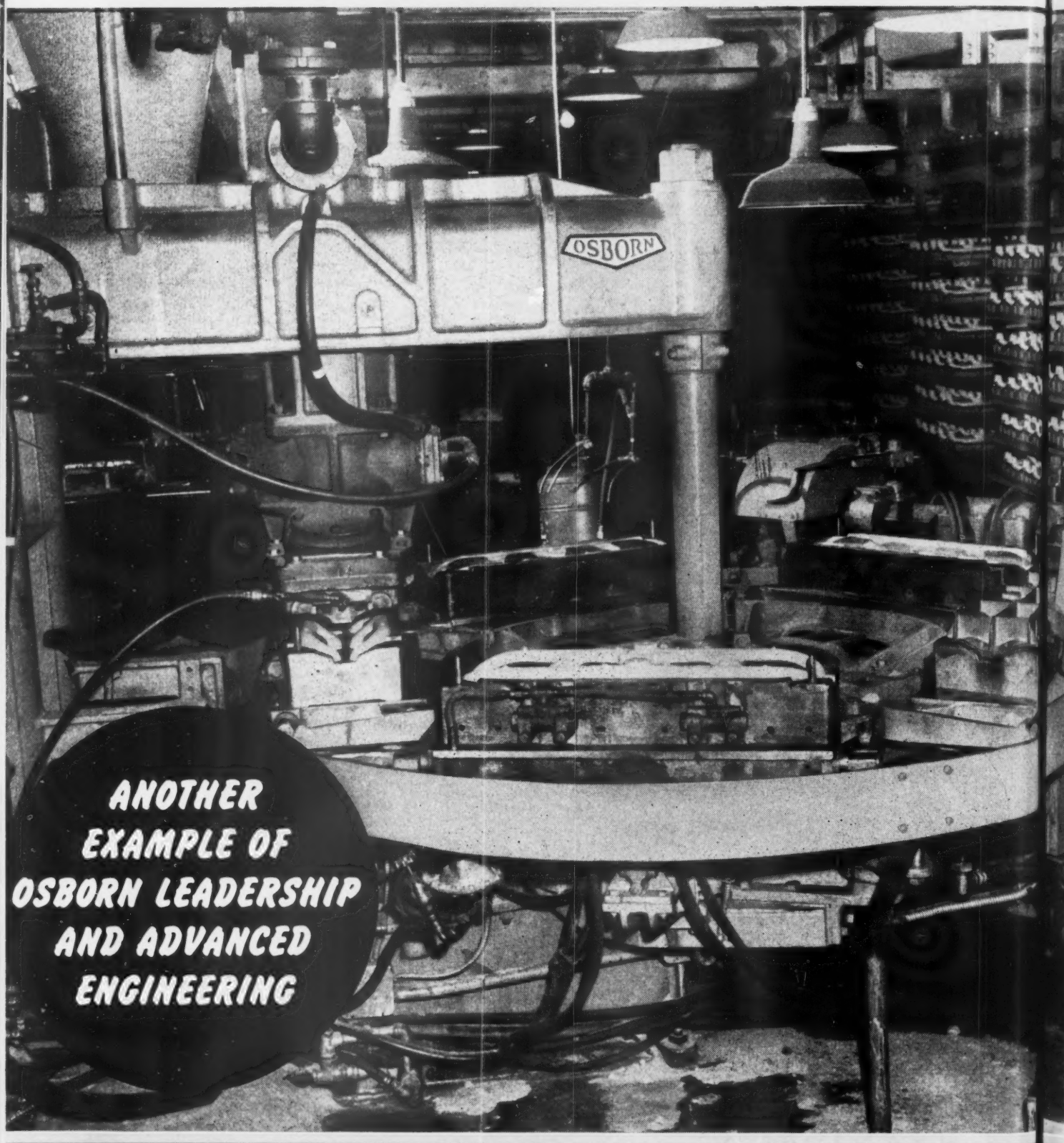

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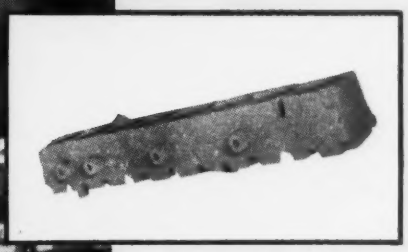

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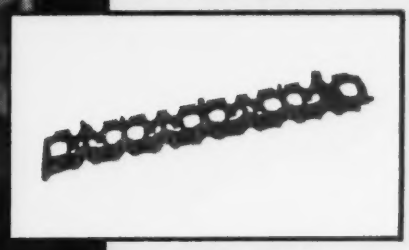
Upper Half
Head Jacket Core



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SOUTHERN CALIFORNIA Chapter of the AFS heard Hiram Brown, chief metallurgist, Solar Aircraft Co., Des Moines, Iowa, discuss "Light Alloy Foundry Practice" at its Mar. 14 meeting in Rodger Young Auditorium, Los Angeles. Shown here, left to right, are: Harold Pagenkopp, Angelus Pattern Works, chapter vice president; Mr. Brown, and Henry Howell, Howell Foundry Co., chapter president. Photo by Ken Sheckler, Calmo Engineering

(*Continued from page* 294)
in the proposed standard for 85-5-5-5 test bars being developed by the AFS in conjunction with the University of Michigan.—*Kenneth F. Echard, Eddy Valve Co.*

Washington

FEBRUARY meeting of Washington Chapter of the AFS was held in Seattle at the Frye Hotel and featured a talk on "Foundry Sands" by Clyde A. Sanders, vice president, American Colloid Co., Chicago.

Mr. Sanders illustrated his subject with slides showing the influence of various molding sand binders on the shrinkage of castings. In a recent research project with iron castings, in which all variables of sand mixtures were accurately controlled, Mr. Sanders reported that shrinkage due to sand was closely linked with the type of binder used. Sands with high flowability with seacoal added produced the least shrink in the test castings while gummy sands with high moisture content produced the greatest shrink.

The speaker stressed the importance of knowing how hard the sand is rammed because, regardless of the type of binder used, only correct ramming will produce the desired rammed density.—*Harold R. Wolfer, Puget Sound Naval Shipyard*

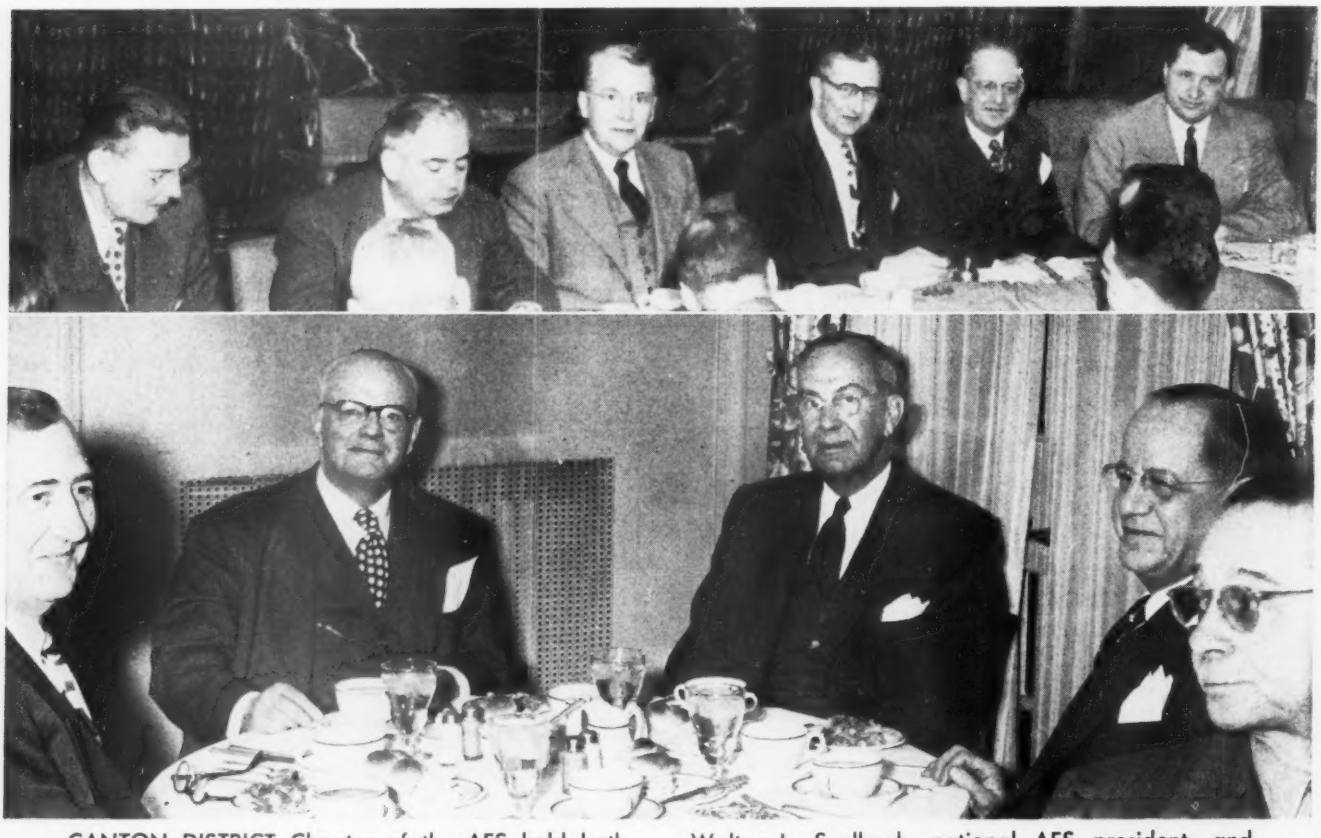
Southern California

A TALK on "Light Alloy Foundry Practice" was presented by Hiram Brown, chief metallurgist, Solar Aircraft Co., Des Moines, Iowa, at the Mar. 14 meeting of Southern California Chapter of the AFS held at Rodger Young Auditorium, Los Angeles.

Mr. Brown pointed out that good foundry practice does not begin with the melting operation, but rather starts with the selection of pots and furnaces. He then described various types of melting equipment and pointed out the advantages and disadvantages of each.

Since many aluminum alloys tend to dissolve steel pots, he recommend-

(*Continued on page* 300)



CANTON DISTRICT Chapter of the AFS held both luncheon and dinner meetings Mar. 6 at the Elks' Club, Alliance, O. At top is a view of the speakers' table at the dinner. Left to right, are: V. J. Sedlon, national AFS director; William W. Maloney, national AFS secretary-treasurer; Frank G. Steinebach, editor, *Foundry*, principal speaker; C. B. Williams, Massillon Steel Castings Co., Massillon, O., chapter chairman; Walter L. Seelbach, national AFS president, and Alexander O. Prentice, Stark Foundry Co.., Canton, O., chapter vice chairman and program director. Bottom photo shows a luncheon group. Left to right are: Mr. Williams; Frank O. Humberger, Massillon Steel Castings Co.; Ralph N. Cole, Canton Malleable Iron Co., Canton; Mr. Seelbach, and Fred A. Basler, A. P. Green Fire Brick Co.

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METROPOLITAN Chapter of the AFS made awards to apprentice contest winners at its Mar. 3 meeting. At left, left to right, are: Russell Brown, New York Naval Shipyard, first prize, nonferrous casting; Stephen Gorto, Barnett Foundry & Machine Co., first prize, gray iron casting; Victor Glinoweicke, Cooper-Alloy Foundry Co., second prize, steel casting, and Steve Matviyetz, Cooper-Alloy Foundry Co., first prize, wood patternmaking. Other winners, not shown in the photo, are: Walter Turrentine, New York Naval Shipyard, first prize, steel casting; Robert Garvey, Curtiss Wright Corp., second prize, wood patternmaking, and Irwin Sacks, New York Naval Shipyard, second prize, nonferrous casting. At right is Clyde A. Sanders, vice president, American Colloid Co., Chicago, who addressed the chapter on "Mold Materials vs. Metal Shrinkage." Photos by John Bing, Metropolitan Refractories Corp.

(*Continued from page* 298)

ed either clay-graphite or silicon carbide crucibles for melting. If iron crucibles are used, care must be taken that they are cleaned and coated with a refractory wash frequently. However, where magnesium is being melted, steel pots are satisfactory. Especially long life can be obtained from steel pots for melting magnesium by metallizing the exterior with aluminum. Mr. Brown emphasized the need for careful and continuous inspection of pots for melting magnesium to prevent costly and dangerous failures.

A discussion of furnace charging, melting of aluminum, melting of magnesium and handling and pouring these metals, with special attention to the use of fluxes and consequent control of gas and dross, then followed. Slides were used to illustrate the various phases of light metal foundry practice.—*Alfred A. Grant III, Grant & Co.*

UNIVERSITY OF MICHIGAN Student Chapter of the AFS was officially recognized and installed Feb. 27 at a banquet in the Michigan Union on the campus. Shown above, top row, left to right, are: John P. Rowe, secretary; Raymond Decker, president; R. A. Flinn, faculty adviser, and Philip E. Lunetta, vice president. Bottom row, left to right: Rodney Sonnenberg, program committee; Sumio Yukawa, treasurer, and G. A. Conger, faculty adviser

University of Michigan

ORGANIZATIONAL meeting of the University of Michigan Student Chapter of the AFS was held Dec. 5. The chapter was officially recognized and installed by the American Foundrymen's Society at a dinner meeting held Feb. 27 in the Michigan Union. More than 100 were present, divided equally between students and guests from the industry as well as several of the university faculty.

Among the speakers were Larry DeBoer, a Foundry Educational Foundation scholarship holder, who reported on the recent FEF conference and summarized the purposes of that organization; Collins L. Carter, president of Albion Malleable Iron Co., Albion, Mich.; Harry W. Dietert, president, Harry W. Dietert Co., Detroit; and Fred J. Walls, Detroit manager of the International Nickel Co. These men spoke briefly on the advantages of AFS membership and emphasized that continued enthusiasm and drive would be necessary for the chapter to be successful.

High point of the meeting came when William W. Maloney, secretary-treasurer of AFS, formally performed the installation and turned over the cast iron rattle to Raymond Decker, chapter's president. Other officers of the chapter are: Philip Lunetta, vice president; John P. Rowe, secretary; Sumio Yukawa, treasurer. Faculty advisors are G. A. Conger and R. A. Flinn—*John P. Rowe.*

Western New York

MARCH meeting of the Western New York Chapter of the AFS drew capacity attendance to hear Richard Herold, Borden Co., New York, present an informative talk on the shell molding process.

Mr. Herold, instead of dwelling on the already known fundamentals of the process, developed and brought forward the latest methods and theories involving curing shells and their assembly for pouring. The practice of assembling with clamps, etc., and the ensuing disadvantages of "backing up" with shot are, according to Mr. Herold, giving way to faster assembly methods through the use of adhesives that are presently being produced specifically for the assembly of shells.

The speaker discussed in detail the simple and inexpensive basic equip-

(*Continued on page* 302)

Here's "on the job" proof of furnace savings with

B&W ALLMUL FIREBRICK

BILLET HEATING FURNACE

"ALLMUL cost half as much!"

A builder of billet heating furnaces used an expensive electrically-fused mullite refractory in the piers and baffles as well as for the arches in the discharge end of the flue. Reason? Severe operating conditions at these points. Tests of B&W Allmul proved it withstood high temperatures equally well . . . cost approximately half as much. Result? Allmul is now standard for these locations.

BUTT WELDING FURNACE

"39 weeks instead of 6 weeks!"

Semi-mullite brick bungs in the hottest part of a butt welding furnace spalled badly after six weeks. Allmul bungs in the same location were still going strong after *39 weeks*—in better condition than the semi-mullite bungs after six weeks. *Yet Allmul cost little more than the original semi-mullite refractory.* Result? B&W Allmul is now used in uptake arches, uptake side walls and crossovers. Customer continues to re-order.

CUPOLA FRONT-SLAGGER

"ALLMUL has 6 times the life plus . . ."

Replacing super-duty firebrick in a cupola front-slagger of a malleable duplexing operation three times a week was an expensive chore. B&W Allmul in the same location lasts approximately two weeks . . . *six times as long.* Costs drop, too, because of savings due to less frequent relining.

What's behind the remarkable, money-saving performance of B&W Allmul Firebrick? The answer lies in its low first cost for a fused mullite brick and unique combination of excellent refractory properties: high hot load strength, high resistance to spalling, good volume stability, a high melting point of 3335F. Bulletin R-29 gives all the facts on Allmul. Write for your copy.

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(*Continued from page* 300)

ment needed to explore the possibilities of production by this method.

A high light of the meeting was the presentation of an award to Joseph H. Sander, president, Tonawanda Electric Steel Casting Corp. for his progressiveness in seeking the aid of the NYSAA to design the company's completely new foundry building. A model of the new foundry was presented Mr. Sander. T. J. Imbs, the architect responsible for the design of this building, also participated in the award.—*E. Kotzin, Curtiss-Wright Corp.*

Northeastern Ohio

APPROXIMATELY 265 members and guests of Northeastern Ohio Chapter of the AFS heard Max Kuniansky, executive vice president, Lynchburg Foundry Co., Lynchburg, Va., discuss "Quality Control" at the Mar. 13 meeting, Tudor Arms Hotel, Cleveland.

The speaker stated that quality control is a top management responsibility A control program must be planned and set up properly, well oriented with procedures in the foundry, and have the backing and support of top management. Mr. Kuniansky emphasized that quality control should be based upon customer specifications and the use to which he intends to put the casting, not upon the foundry's conception of quality.

At a separate session, Ernest E. Harkess, Ford Motor Co., described pattern equipment and methods designed and installed for use on the high-production lines in the new Cleveland engine plant. Since the plant is still in the formative stage, no production figures are available. However, the speaker stated the plant was designed to produce 4500 sets of engines castings per day.

A series of colored slides showed examples of coremaking machines, jigs and fixtures. Speaker's comment included intimate detail on pattern technique involved in the design the construction of the various items. Coreboxes, dryers and plates are magnesium. Wear edges on all items are faced with steel strips. Standardized equipment, carefully controlled sequence of operation, and a certain amount of flexibility insure straight-line production from raw material to finished castings.

Winners of apprentice contests sponsored by the chapter and the patternmaking division were announced and prizes awarded. In gray iron molding Donald Marinelli, Fulton Foundry & Machine Co., won first prize; Raphel Lindsey, Fulton Foundry, second, and James McNutt, Cleveland Trade School, third.

First prize in the nonferrous division went to William Pitcher, with Lynn Northway and Robert Perry taking second and third. All three are students at Cleveland Trade School. In wood patternmaking Fred Fiorentini, Modern Pattern Co., won first prize. Second and third were taken by James Orban and Donald Siebert, both of Royal Pattern Works. John Bolibrush, Motor Pattern Co., won first in metal patternmaking.

James G. Goldie, Cleveland Trade School, was the coffee speaker, and his subject was "Encouraging Youth of the Trade School Level." He stated that foundries should encourage youth to continue their education when they have entered a foundry after completing formal schooling. Plants can do this by having a planned program of education and systematic advancement of their apprentices. Thus they offer youths opportunity and not just a job.—*Robert H. Herrmann and Pat Dwyer.*

Twin City

CONSIDERATION of the "Effect of Mold Materials on Metal Shrinkage" was featured at the Mar. 11 meeting of Twin City Chapter of the AFS. More than 100 members and guests were present to hear Clyde A Sanders, vice president, American Colloid Co., Chicago. Mr. Sanders supplemented his discussion with a 15-minute motion picture of his laboratory work on the subject at Michigan State College, together with colored slides which showed in detail the metal shrinkage reaction to molding materials.

The speaker believes that to stabilize mold wall movement, the molding sand should be more brittle and rigid on ramming. This can be accomplished by: Reducing water content; switching from western to southern bentonite; switching from southern bentonite to fire clay; adding a cellulose material such as wood flour; adding more seacoal.

In addition, two other discussions were held during the meeting. Ed Oldfield, Minneapolis-Moline Power Implement Co., Minneapolis, was moderator of a group discussing refractory problems; Richard Wilson, American Hoist & Derrick Co., St. Paul, addressed a group on alloying agents for cast iron—*J. D. Johnson, Archer-Daniels-Midland Co.*

TWIN CITY Chapter of the AFS heard Clyde A. Sanders, American Colloid Co., Chicago, speak at its March meeting in the Covered Wagon, Minneapolis. Shown above, left to right, are: Herbert Blosjo, Minneapolis Steel Castings Co.; Kenneth Briggs, Miller & Co., Chicago, and Mr. Sanders

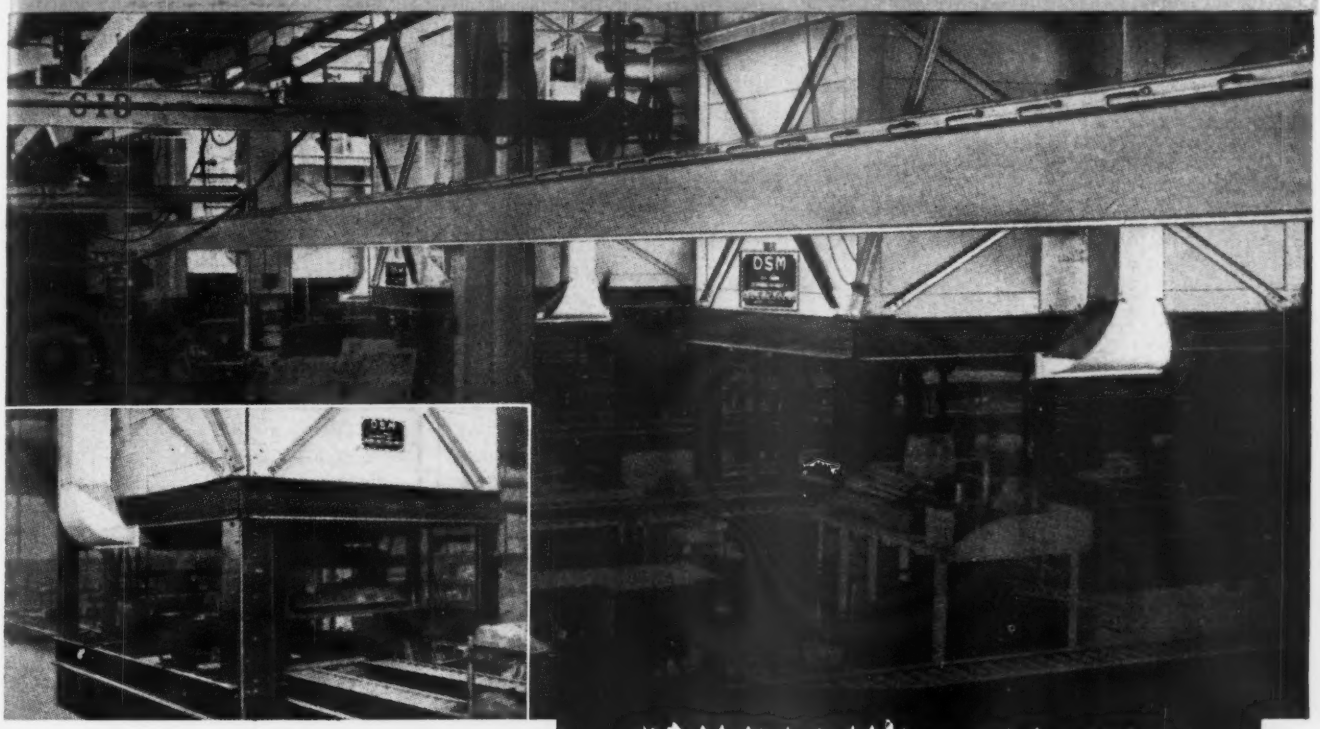
Detroit

WITH Howard H. Wilder, manager of Vanadium Corp.'s Iron Foundry Division, as conductor, the Detroit AFS chapter held its defective casting clinic at the Mar. 20 meeting in Detroit Leland Hotel.

Prefacing a lively discussion period in which members of the audience voiced their opinions on the remedies for the defects exhibited in several castings, Mr. Wilder asserted that the cause of much foundry scrap lies with the management. A foundry which takes on any kind of work without proper regard to its own limitations will create excessive scrap, he said. Management may be responsible for the intake of poor metallics and permit contaminants to enter the melt. Management, furthermore, may be at fault when the carelessness of men in the foundry causes the

(*Continued on page* 304)

Part of a Battery of DSM Vertical core ovens. Note Sturdy Construction



The double deck carrier on the roller conveyor has just been set down by the oven pendants. Another carrier is just coming down to be loaded. Loaded carriers are picked up at the opposite side by the fingers of the oven pendants.

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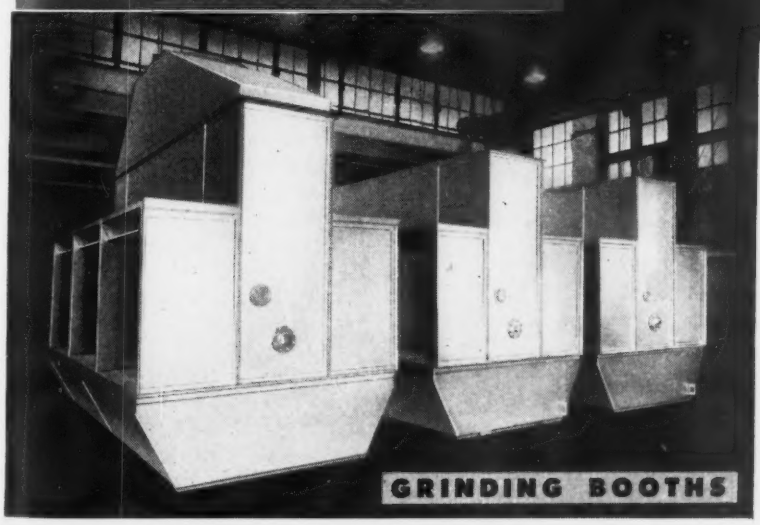

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(*Continued from page* 302)
scrap. Many complaints against quality of castings the last several years, however, stem from conditions outside the foundrymen's control, he added. Off-grade coke is one of these, and in the next five years, he predicts, it may be necessary to use more beehive coke.

In the attempt to make foundry operations as foolproof as possible, automatic and semiautomatic machines are being added to minimize the vagaries of the human element, but no matter how complete the mechanization becomes, brains will still be needed in the foundry, he declared.

From the floor came additional support for the idea that most foundry scrap is made in the foundry's engineering department and by the supervisory personnel, not by the men in physical contact with the castings. Admitting that bad castings are bound to occur, several participants in the discussion stressed the importance of discovering such defective castings promptly. One suggestion for catching defects resulting from sand deformation involves weighing sample castings selected by statistical methods. This procedure may disclose a potential trouble spot before the operation is completely out of control, it was said. Defects in gray and malleable iron, steel and nonferrous metals were discussed.

At the chapter meeting, Apr. 24 in the Detroit Leland, members discussed "Castings vs. Patterns" in a roundtable program. A reception for 75 foreign foundrymen was on the agenda.—*Howard C. Tuttle.*

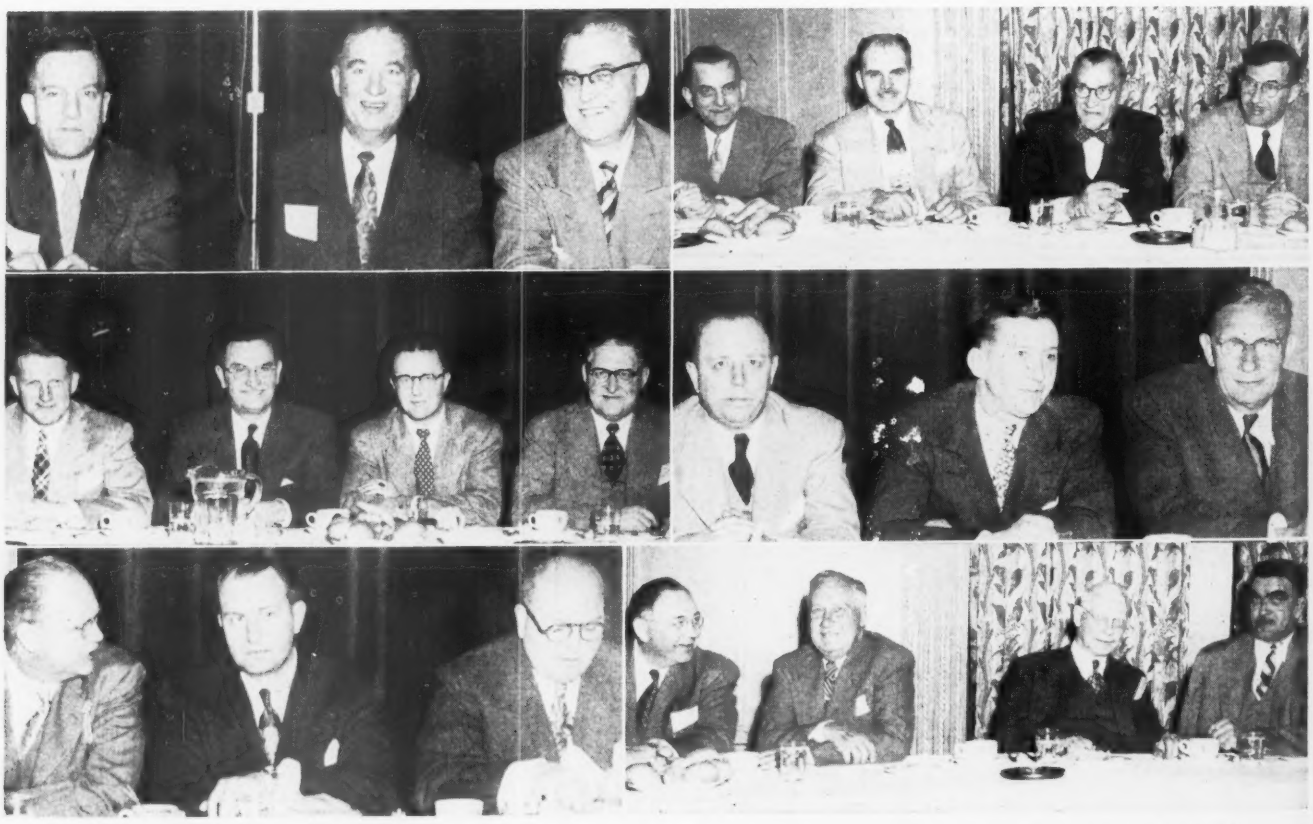
Wisconsin

AT THE "Management Night" meeting of Wisconsin Chapter of the AFS held Mar. 14 at the Schroeder Hotel, Milwaukee, George A. Sievers, president of the Industrial Engineering Institute of Milwaukee, presented a talk on "Psychological Aspects for Working with People" in which he discussed methods of making efficient workers out of employees in foundries and other types of businesses, without appearing to be "bossing" them.

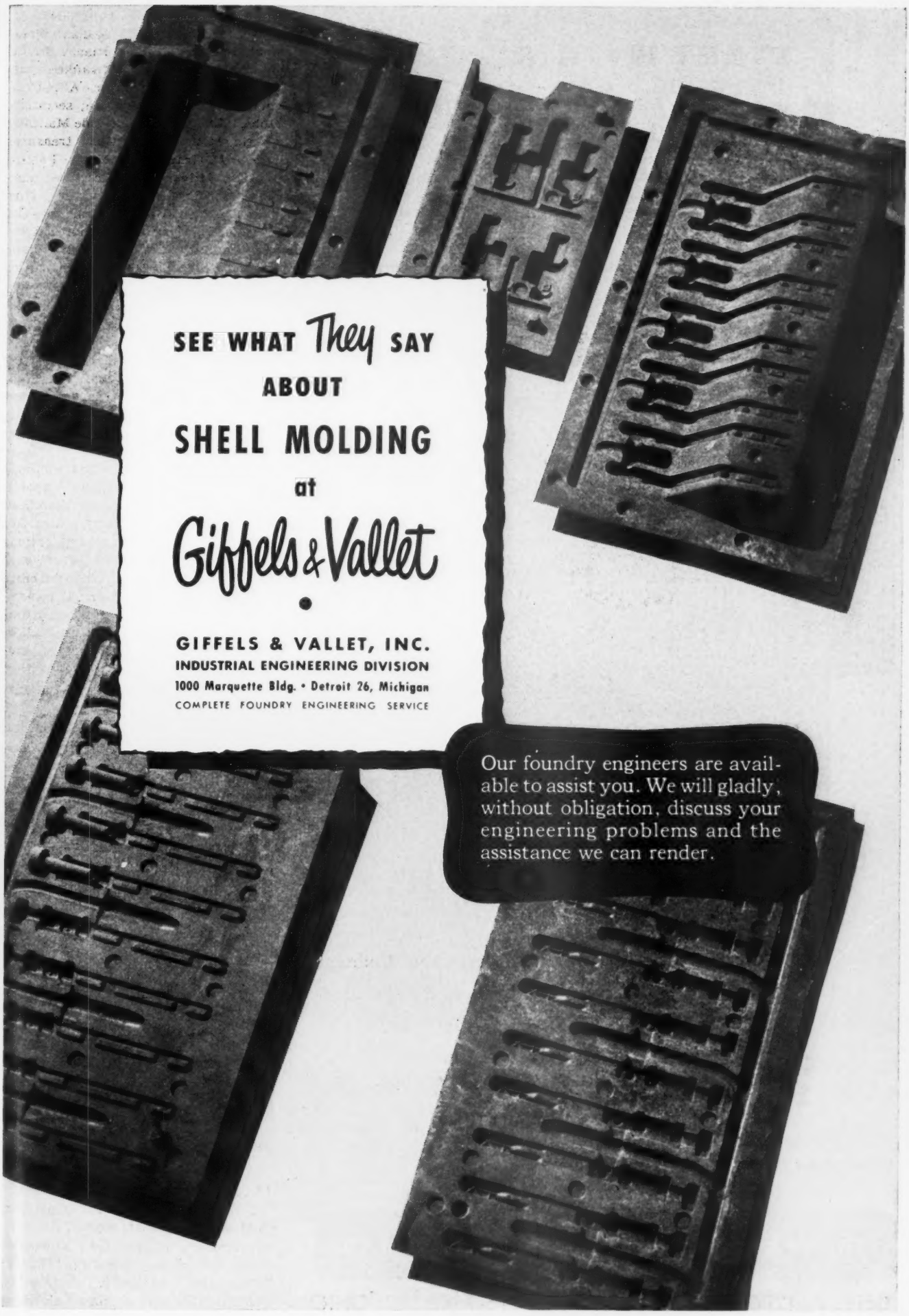
Since all employees of an organization, from top management down to the ordinary worker, spend more than half their waking hours on the job, what happens on the job is important to all of them. Among the points stressed was the choosing of men who work well with people to serve as foremen; indoctrination of new employees so they may learn something of the company, its philosophy and policies, in addition to its rules, the provisions of the union contract and his clock number. He also asked the men concerned with management to spend some time in self examination and see how they are expressing the fundamentals of the American way of life based on the dignity and right of all individuals in the operation and administration of their businesses.

The nominating committee offered the following slate of officers to

(*Continued on page* 306)



WISCONSIN Chapter of the AFS celebrated management night Mar. 14. Views of the speakers' table are shown above. Top, left to right, are: F. Katzenski, International Harvester Co.; G. E. Tisdale, Zenith Foundry Co., chapter chairman; G. A. Sievers, Industrial Engineering Institute, who spoke on "Psychological Aspects for Working with People;" Frank F. Lipperer, Filer & Stowell Co.; L. J. Andres, Lawran Foundry Co.; J. G. Gratz, G & O Pattern Works, and G. S. Gilson, J. E. Gilson Co. Middle row: John McBroom, Stainless Foundry & Engineering Co.; E. Carpenter, Carpenter Bros. Inc.; R. Smith, Sterling Wheelbarrow Co.; M. O. Holtan, Slinger Foundry Co.; R. Thiesen, Krause Milling Co.; H. Klopf, General Foundries Co., and Walter Gerlinger, Walter Gerlinger Inc. Bottom row: N. Amrhein, Federal Malleable Co.; H. A. Schwengel, Modern Equipment Co.; J. A. Gitzen, Delta Oil Products Co.; E. C. Wussow, Kaukauna Machine Corp., P. Kreulen, Grede Foundries Inc., W. V. Osborne, Lakeside Malleable Castings Co., and F. A. Pampel, Chain Belt Co. Photos by W. V. Napp, Delta Oil Products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(*Continued from page* 304)

serve for the 1952-53 season: President, Joseph C. Risney, Risney Foundry Equipment Co., Milwaukee; vice president, A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee; secretary, Robert V. Osborne, Lakeside Malleable Casting Co., Racine, Wis.; treasurer, Leonard Gratz, G. & O Pattern Works, Milwaukee. Directors nominated for three-year terms are: Norman Amrhein, Federal Malleable Co., West Allis, Wis.; L. J. Andres, Lawran Foundry Co., Milwaukee; and Frank Kulka, Motor Castings Co., Milwaukee.— *John E. Hubel.*

Toledo

AT THE Mar. 12 meeting of Toledo Chapter of the AFS, William F. Winemiller, chief sales engineer, Norton Refractories Division, Norton Co., spoke on "Foundry Refractories."

Mr. Winemiller described methods of manufacture of silicon carbide, fused alumina, fused and stabilized zirconia and related refractories. He then described foundry applications for these "super refractories" and answered questions on the possibility and practicability of their use in various applications. Careful consideration of service conditions may allow the use of a super-refratory at considerable savings despite higher first costs, he said.—*Jerry Grott, Unitcast Corp.*

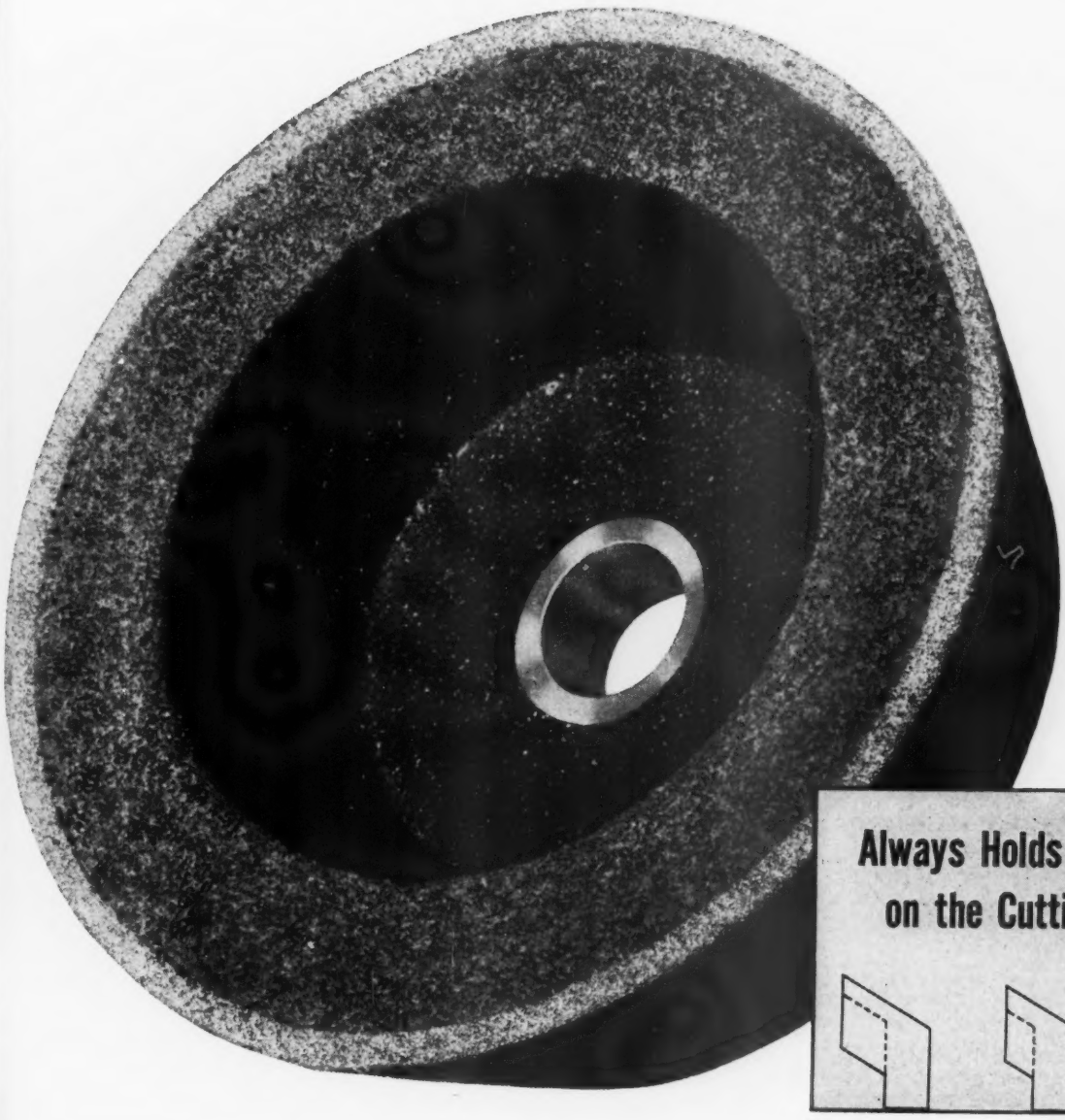
New England

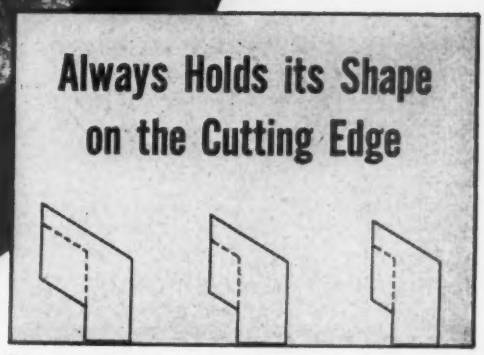
THERE were 170 members and guests present at the Mar. 12 meeting of the New England Foundrymen's Association, held at the Parker House, Boston. Speaker was Dr. E. I. Valyi, Shellmold Machine Co. Inc., New York. A graduate of the Federal Polytechnic Institute of Zurich, Switzerland, Dr. Valyi has had

(*Continued on page* 308)

TOLEDO Chapter of the AFS met Mar. 12 at the Toledo Yacht Club, Toledo, O., to hear William F. Winemiller, chief sales engineer, Norton Refractories Division, Norton Co., Worcester, Mass., left above, speak on "Foundry Refractories." At right is J. A. Mescher, Unitcast Corp., chapter chairman

How U. S. Rubber improved cup wheels





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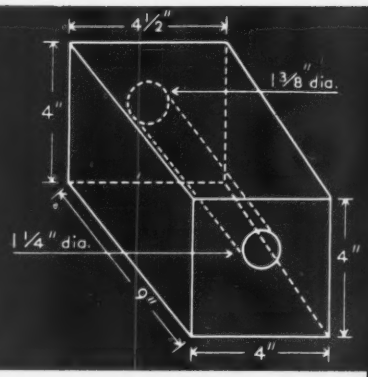

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(*Continued from page* 306)

considerable experience in the die sand and precision casting field.

He described the general principle and equipment needed to produce shell molds and stated that considerable progress has been made with the process, with production rising in the automobile, farm equipment and machinery industries. He described in some detail and illustrated with slides the many steps in the production cycle. He then touched upon production possibilities, yield, cost, and possible applications.—*Myron DeHollander, General Electric Co.*

Chicago

Three roundtables provided the program for the March 3 meeting of the Chicago Chapter, AFS, held at the Chicago Bar Association. An attendance of 190 testified to the popularity of the group session type of program.

Chapter Chairman Walter W. Moore, Burnside Steel Foundry Co., presided at the general portion of the meeting. He announced appointment of three immediate past chairmen to constitute the nonimating committee to report at the April meeting with recommendations for 1952-53 officers. This committee consists of C. V. Nass, Pettibone Mulliken Corp.; W. D. McMillan, International Harvester Co. and Fred B. Skeats, Link-Belt Co.

Mr. Moore also announced that the chapter's May meeting would be postponed to Tuesday, May 13, to avoid conflict with the AFS Congress in Atlantic City.

Reporting for the Educational Committee, its chairman, Roy W. Schroeder, Navy Pier Branch, University of Illinois, stated that registration for the "Melting School" to be conducted in March was expected to exceed 400.

Leroy E. Taylor service engineer, Geobig Mineral Supply Co., chairmaned one roundtable in which the gray Iron and Malleable divisions combined in sponsorship. Subject discussed was "Sand," and members of the panel included: Karl J. Jacobson, chief chemist, Griffin Wheel Co.; A. C. Den Breejen, foundry superintendent, Nichol-Straight Foundry Co.; Leo F. Dennie, technical service, Black Products Co.; C. F. Semrau, metallurgist, Illinois Malleable Iron Co. and Edwin J. Jory, foundry engineer National Malleable & Steel Casting Co.

The Steel division roundtable considered "Basic Aspects of Ferroalloy Conservation," with Mitchell Silver-

(*Continued on page* 312)

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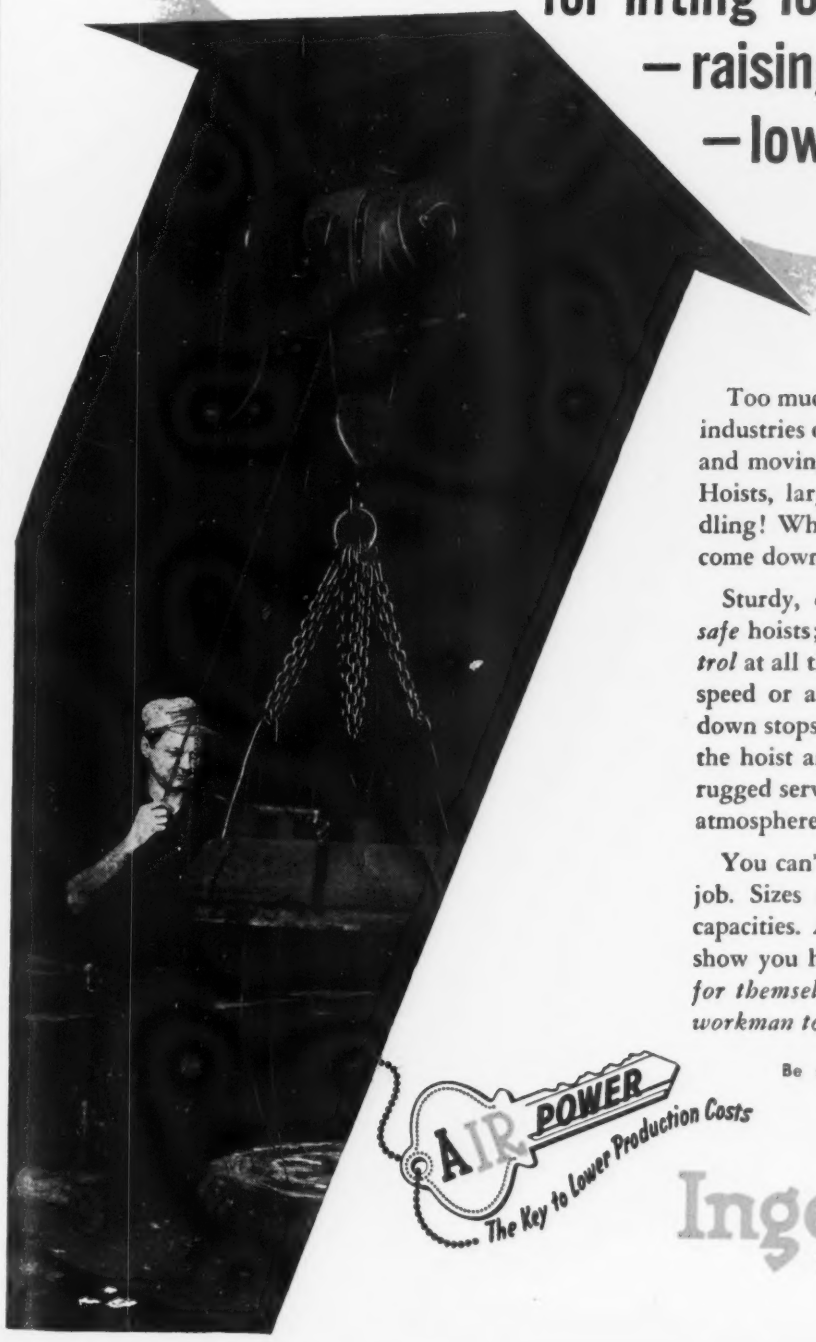

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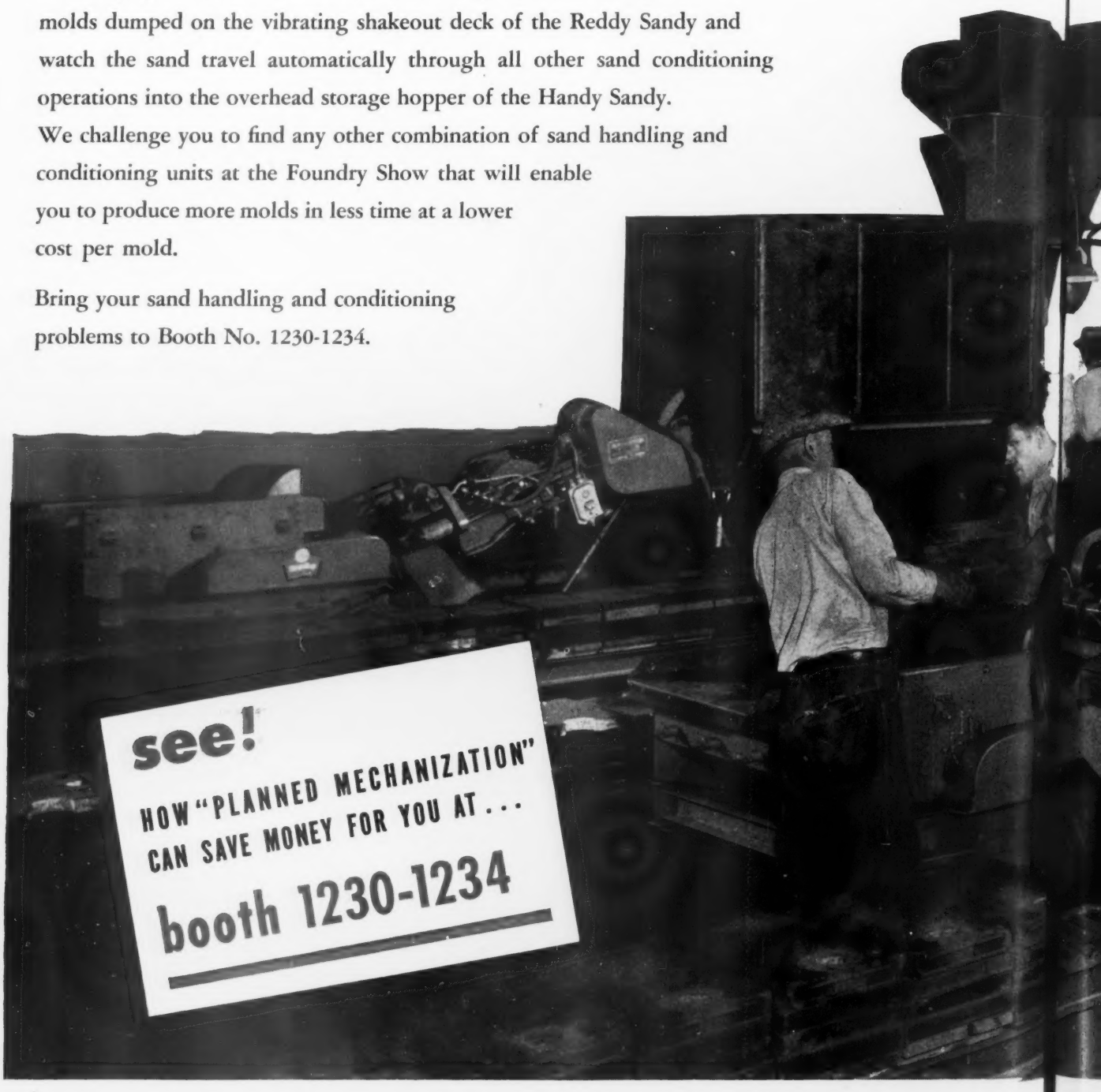

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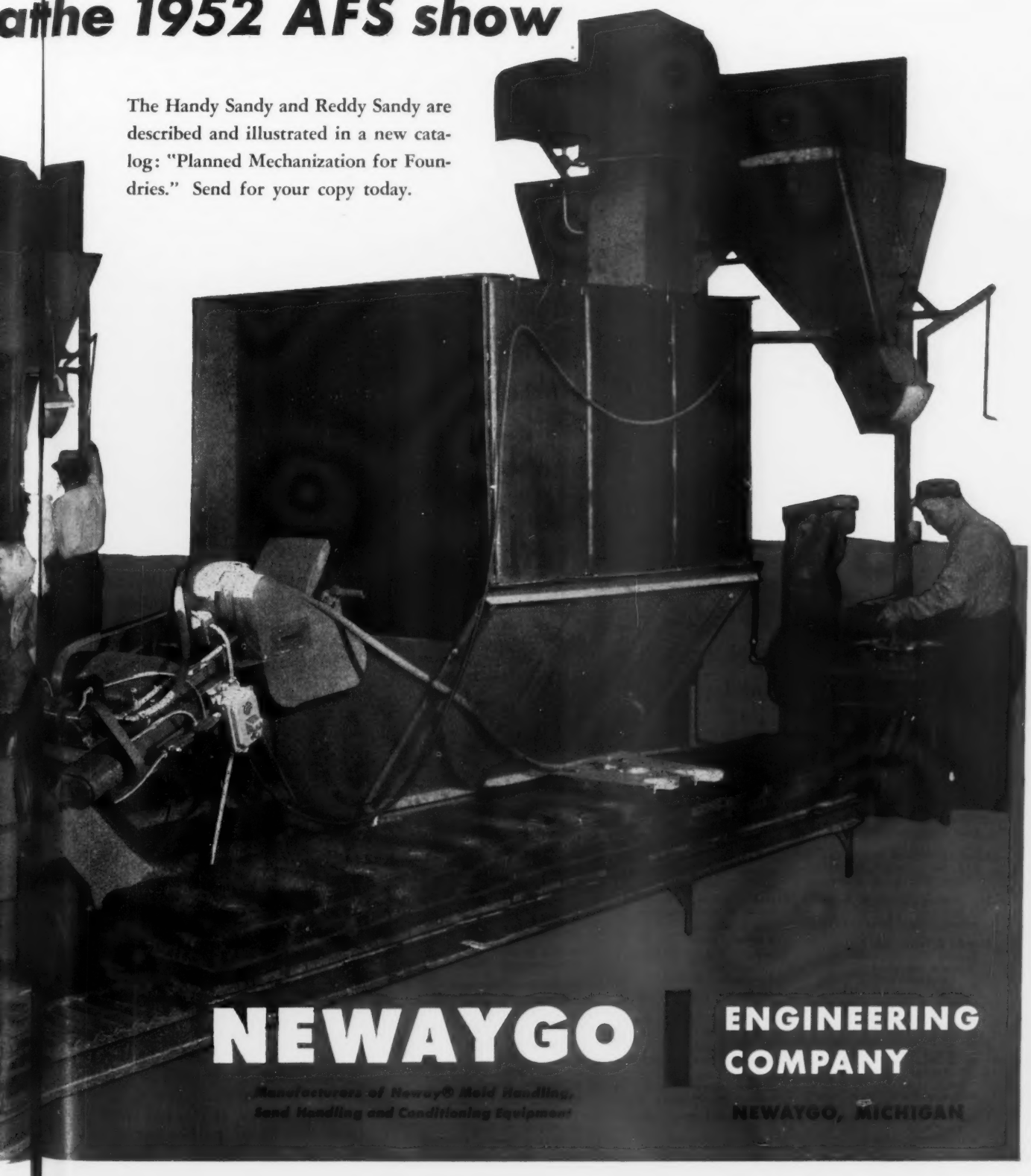

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G. W. Bryant Core Sands, Inc.
McConnellsville, New York

Lloyd H. Canfield Foundry Supplies
Kansas City, Kans.

Combined Supply and Equipment Company
Buffalo 7, N. Y.

The Foundries Materials Co.
Coldwater, Mich. Also (branch) Detroit, Mich.

Foundry Service Company
North Birmingham, Ala.

James R. Hewitt
Houston, Texas

Interstate Supply & Equipment Co.
Milwaukee 4, Wis.

Independent Foundry Supply Co.
6463 East Canning Street
Los Angeles, Calif.

Industrial Supply Co.
San Francisco, California

Klein-Farris Co., Inc.
Boston, Massachusetts
New York—Hartford, Conn.

La Grand Industrial Supply Co.
Portland, Oregon

Marthens Company
Moline, Illinois

Carl F. Miller & Co.
Seattle, Washington

Pennsylvania Foundry Supply & Sand Co.
Philadelphia, Pennsylvania

Refractory Products Co.
Evanston, Illinois

Robbins & Bohr
Chattanooga, Tennessee

Smith-Sharpe Company
Minneapolis, Minnesota

Steelman Sales Co.
Chicago, Illinois

Stroller Chemical Co.
Akron, Ohio

Wehenn Abrasive Co.
Chicago, Illinois

Western Materials Co.,
Chicago, Illinois

Mr. Walter A. Zeis
Webster Groves, Missouri

(*Continued from page* 308)

stein, vice president, Specialloy Inc., as speaker. Robert L. Heath, district manager, Climax Molybdenum Co., was chairman.

Fred L. Riddell, foundry metallurgist, J. Kramer & Co., conducted a discussion on "General Nonferrous Foundry Practice" at the Nonferrous roundtable.

The chapter, at its regular monthly meeting Apr. 7, had Warner B. Bishop, manager, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, as speaker on "Control of Core Production." The program included the showing of that company's film, "The ADM of Cores."—*Erle F. Ross*

Lancaster-York

SOME Foundry Problems and Experiences with Ductile Iron Castings" was the title of the talk given by Douglas James, superintendent, Cooper-Bessemer Corp., Grove City, Pa., at the February meeting of the Conestoga Foundrymen's Association.

Using slides, Mr. James showed castings made by Cooper-Bessemer the past two and a half years and discussed problems encountered. Castings ranging from 100 to 3000 pounds have been produced satisfactorily in dry sand molds, with special attention given to cupola melting control, laboratory control and gating practice. However, pinhole porosity is still encountered in light castings made in green sand molds.

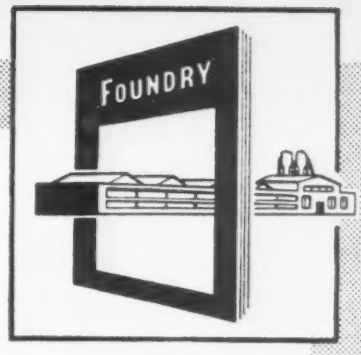
At the business meeting preceding the featured speaker, the nominating committee presented the following slate of officers for 1952-53: Chairman, Donald Smith, Riverside Foundry, Wrightsville, Pa.; vice chairman, Lawrence Carey, Lancaster Malleable Co., Lancaster, Pa.; treasurer, David Keener, Burnham Corp., Lancaster, Pa.; secretary, A. G. Witte, Columbia Malleable Castings Corp., Columbia, Pa. Nominated to the board of directors are: J. Kenneth Smith, New Holland Brass, Bronze & Aluminum Co., New Holland, Pa.; and William Flinchbaugh, York Corp., Lancaster, Pa.—*Mark E. Mohr, Hershey Machine & Foundry Co.*

Saginaw Valley

FIRST annual ladies night of the Saginaw Valley Chapter of AFS was held Feb. 7 at Frankenmuth, Mich. with a capacity crowd of 350 present. Orchid corsages were presented to the ladies and music during and after dinner was provided by Gertrude Garvin.

Dr. Alfred P. Haake, writer, lecturer, mayor of Park Ridge, Ill., and

(*Continued on page* 315)



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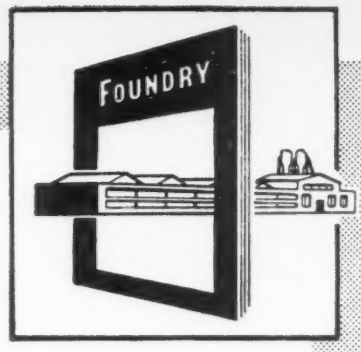

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FOUNDRY
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(*Continued from page* 312)

a consultant to General Motors Corp., was the speaker. He was introduced by R. Verne Righter, Central Foundry Division of GMC. Dr. Haake's subject was "Management—the Key to Progress." It applied not only to management in industry but also in the home as well. He stressed honesty, especially, as a requirement; and pointed out that management is simply the ability to get people to do those things which they ought to do, even without having to ask them to do it. The ideas presented and the manner of presentation proved interesting to all present.—*Roy S. Dahmer, Eaton Mfg. Co.*

Quad City

AT "BOSSES NIGHT" of the Quad City Chapter of the AFS, held Mar. 17 at the Fort Armstrong Hotel, Rock Island, Ill., approximately 135 members and guests were present to hear Ralph L. Lee, public relations department of General Motors Corp., and columnist for FOUNDRY.

Mr. Lee spoke on the "Science of Humanics," in which he pointed out the necessity of dealing with the facts in our relations with employees. He described very vividly that everyone is different and that most people cannot change as much as we think. He also emphasized that no one is the same all the time, and must be dealt with accordingly. He closed by pointing out that one is as God made him, and that behavior of an individual is the product of the kind of person he is multiplied by the conditions that exist divided by the shape he is in. Alex Matheson, French & Hecht Division, Kelsey-Hayes Corp., served as technical chairman.

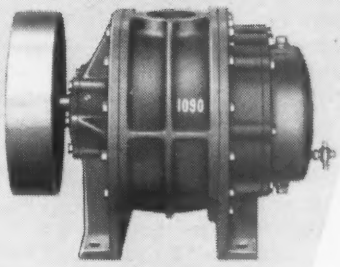
Preceding the talk by Mr. Lee, entertainment was furnished by Johnson's Melody Men, a group of singers from one of the local foundries.—*Eric Welander, John Deere Malleable Works.*

East Texas

MEMBERS of the Texas Chapter of AFS from the eastern section of the state, have organized an East Texas section of the chapter and have held three meetings which have met with considerable enthusiasm by the foundrymen in that area. The January meeting was held at Marshall, Tex.; the February meeting was held at Lone Star, Tex., and included a plant inspection of the Lone Star Steel Co. in that city together with a dinner and movies in the evening. The Mar. 14 meeting was held at Tyler, Tex. It is the group's plan to rotate the meetings between the towns of Marshall, Lone Star, Tyler,

For 10 CFM or 100,000 CFM ...compare blower values

ROTARY



Typical low-capacity R-C Rotary Positive Blower. Sizes range from 5 cfm to 50,000 cfm, permitting selection closely matched to needs.

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- ☐ Capacity matched to the job
- ☐ Easy accessibility
- ☐ Ruggedness
- ☐ Ease of installation
- ☐ Ability to handle overloads
- ☐ Long-time durability
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- ☐ Low maintenance costs
- ☐ Engineering assistance
- ☐ Proved reputation of maker
- ☐ Customer satisfaction

No need to take chances when buying blowers, exhausters or gas pumps. Just put this "detector test" to work on your specific problem and you'll arrive at the most satisfactory answer.

For instance, if you're debating between Rotary Positives and Centrifugals, remember that only Roots-Connersville builds both—the exclusive *dual-ability line* that permits unbiased recommendations. Their wide range of capacities supplies sizes and types that are quite likely to be most closely matched to your needs.

For economy of operation, reliability and low maintenance, we refer you to a list of users that dates back almost a century. If you'll rate your possible choices on a performance basis, you'll usually find R-C equipment "tops" on the list.

To help you make the most profitable, practical decision, our experience is at your service.

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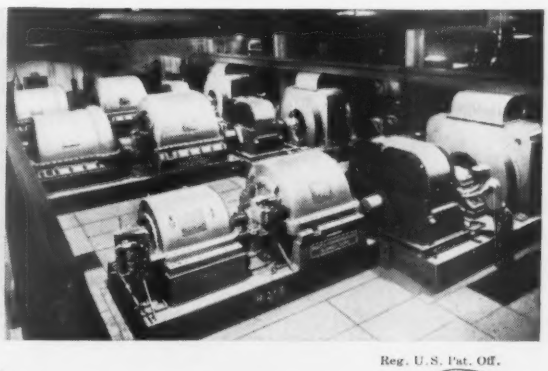
Six R-C Multi-Stage Centrifugal Blowers equipped with automatic regulators to provide extremely wide range of operation at various pressures and capacities.



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and Longview, Tex., and Shreveport, La., all of which are within 1 or 1½ hour's drive of the other.

Serving as chairman of the section is Robert C. Harrell, Lone Star Steel Co., Lone Star, Tex., and Robert K. Hoague of the same company is recording secretary. Committeemen are Paul Martin, Brewster Co., Shreveport, La.; Joe Nettles, Mid-Continent Steel Casting Co., Shreveport, La.; R. E. Smith, Sollberger Engineering Co., Marshall, Tex.; William Speas, Tyler Pipe & Foundry Co., Tyler, Tex.; and Russell McBride, McBride Pattern Works, Longview, Tex.—*Robert C. Harrell, Lone Star Steel Co.*

Central Indiana

A DEMONSTRATION of the laboratory method of making shell molds was presented by Fred Carl, Arthur Anderson and William Hollar, Fabricast Division of General Motors Corp., at the Mar. 3 meeting of Central Indiana Chapter of the AFS. A panel discussion followed the demonstration in which the opinion was expressed that shell molding has a definite place in the casting industry but does not supplant any of the present foundry methods.—*Paul V. Faulk, Electric Steel Castings Co.*

Central Illinois

AT THE February meeting of the Central Illinois Chapter of AFS, attended by 140 members and guests, Richard Herold, Borden Co., New York, discussed "Shell Molding." He stated that the process will not replace sand and die cast molding, but is applicable to various types of castings. Some large companies have spent millions of dollars in research on this process and have found that it is possible to produce castings with a tolerance of 0.002 to 0.003 in. per inch. The process has been adopted by both jobbing and production foundries. Sample molds were available for inspection.—*G. F. Lloyd, Brass Foundry Co.*

Connecticut Non-Ferrous

A LARGE attendance was present at the Mar 19 meeting of the Connecticut Non-Ferrous Foundrymen's Association held at the Castle Restaurant, New Haven, Conn. Principal speaker was J. F. Ramey, Minnesota Mining & Mfg. Co., who spoke on "Belt and Disk Grinding," in which he discussed various applications for coated abrasives in the non-ferrous foundry. The meeting also included a film showing many applications for coated abrasives in jet plane building.—*Louis G. Tarantino, Niagara Falls Smelting & Refining Co.*

New Jersey

While foreseeing some easing in foundry operations this year compared with 1951, Kenneth Kramer executive editor, *Business Week*, looks for investment in plants and equipment, especially equipment, to be sustained on an average and also for some relaxation in government restrictions on the manufacture of consumer durable goods, all of which should tend to bolster foundry activity in1952.

He spoke before the New Jersey Foundrymen's Association, Military Park Hotel, Newark, N. J., Monday evening, Feb. 18

Donald H. Workman, executive vice president, Gray Iron Founders' Society, Cleveland, outlined the society's activities at the March meeting of the New Jersey Foundrymen's Association. He spoke particularly of the meeting the officers of the gray iron, steel and malleable societies had early in March in Washington with Director of Defense Mobilization Charles E. Wilson, prior to his resignation; also of the financial survey which the gray iron foundry industry is arranging to have conducted by Ernst & Ernst, certified public accountants. The survey will cover statistics for the years 1946-1951, inclusive. Importance of such statistical information in dealing with government agencies was emphasized.—*Ben K. Price*

Tri-State

SPECIAL guests at the Mar. 14 meeting of the Tri-State Chapter of the AFS were L. C. Farquhar, American Steel Foundries, East St. Louis, Ill., a national director of the AFS, and a number of students who are taking foundry courses under the auspices of the educational division of the chapter.

Speaker at the meeting was Albert G. Zima, head of the western technical section of Internatioal Nickel Co., Los Angeles, whose talk was entitled "Steel Castings," and consisted mainly of a comparison of engineering properties between castings, forgings and weldments.—*J. G. Winget, Reda Pump Co.*

Reading

MEETINGS of special interest to both ferrous and nonferrous foundrymen were arranged for the Mar. 18 meeting of the Reading Foundrymen's Association at the Berkshire Hotel, Reading, Pa.

Speaker for the ferrous group was M. W. Demler, Harbinson-Walker Refractories Co., Pittsburgh, who discussed "Linings for Basic Cupola Operation."

In addition, there was a symposium on brass, bronze and aluminum practice at which James M. Woodward, Excelsior Brass Works served as moderator.—*W. I. Cassidy.*

Eastern Canada

AT the Mar. 14 meeting of the Eastern Canada Chapter of AFS, Prof. Howard F. Taylor, Massachusetts Institute of Technology, spoke on "Modern Trends in Foundry Practice."

Progress in cast iron metallurgy is, he suggested, hampered by lack of fundamental study of the physical chemistry of cast iron. He predicted improvements in cupola melting of iron by hot blast, closed pressure

(*Concluded on page* 318)

CENTRAL INDIANA Chapter of the AFS saw a demonstration of shell molding at its meeting Mar. 3. Above, left to right, are: Fred Carl, Arthur Anderson and William Hollar, Fabricast Division, General Motors Corp., who gave the demonstration, and Carl Schopp, Link-Belt Co., Indianapolis, chapter vice chairman. Photo courtesy Henry O. Yeager, International Harvester Co.

PETER VISCHER
The Craftsman
St. Sebald's Church
Nürnberg

An Heritage of skill in a craft

Peter Vischer, the great bronze founder, was a Fifteenth Century Guild Master and responsible for some of the most artistic castings that are today looked upon as examples of all time expert design and workmanship.

As a boy Peter worked as an apprentice with his father. In those days every youth destined for a certain trade had to be apprenticed to a Master who was responsible for his education.

This tradition has been carried on through the centuries—and today in our own plant we have many sons working along side of their experienced fathers. As an example, here is an illustration of Master Craftsman Ben Szymanski and his well-taught and equally accomplished son George B. Szymanski.

PERMANENT MOLDS • WOOD AND METAL PATTERNS • KELLER AND DUPLICATOR WORK • MACHINE WORK • MALLORY METALS BERYLLIUM COPPER • MONEL METAL • EVERDUR CASTINGS COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY • BRASS, BRONZE AND ALUMINUM CASTINGS

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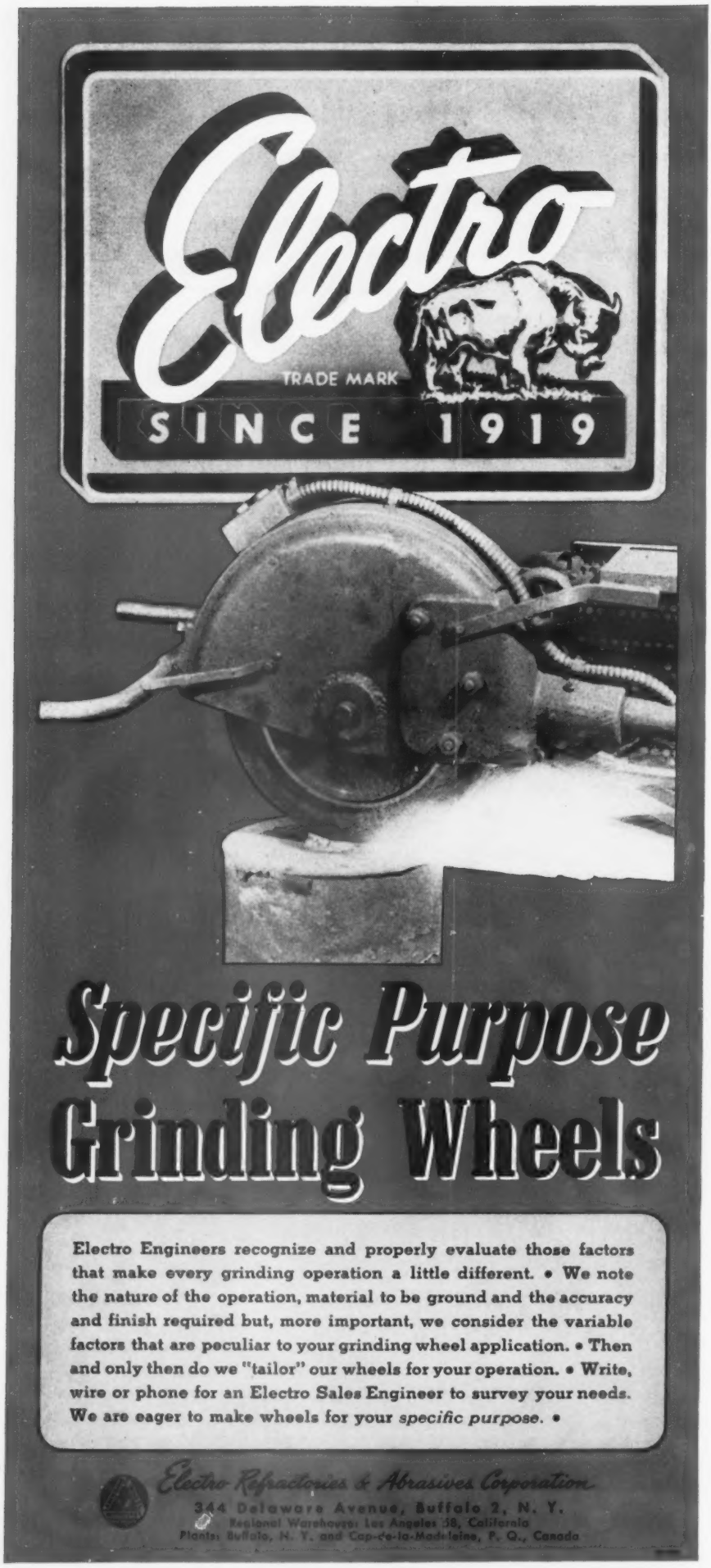
FOUNDRY AND MACHINE CO.

1161 HARPER AT RIVARD • DETROIT 11, MICHIGAN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344 Delaware Avenue, Buffalo 2, N. Y.
Regional Warehouse: Los Angeles 58, California
Plants: Buffalo, N. Y. and Cap-de-la-Madeleine, P. Q., Canada

(*Concluded from page* 316)

stacks and basic linings. Still greater understanding of sand and its bonding agent is required. Professor Taylor believes shell molding provides the nearest approach to ideal molding practice in that it allows the sand grains to find their most effective arrangement against the pattern in dry state followed by bonding together with molten plastic. Many other modern trends also were dealt with by the speaker.—*A. E. Cartwright, Crane Ltd.*

Electric Furnace Melting

(*Continued from page* 161)

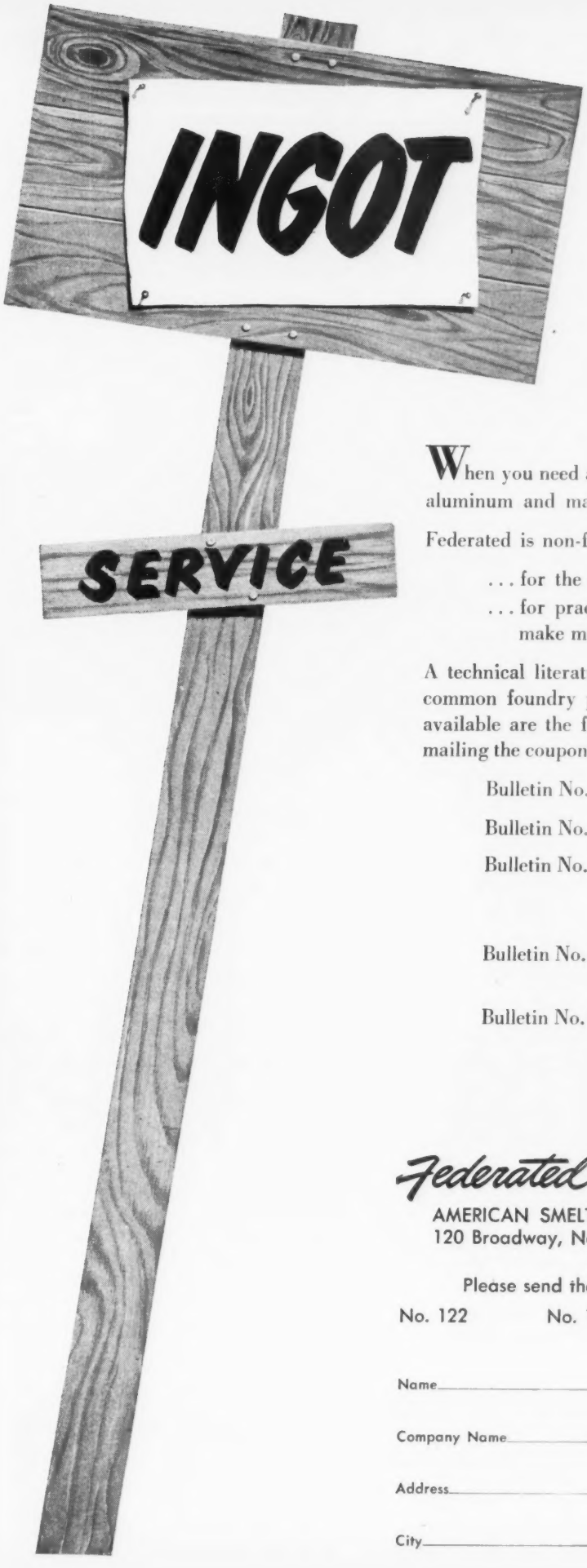
used as refractory material for the bottom decreases as its temperature rises, more and more of the current flows through the hottest area, and it soon becomes so hot and soft that the melted steel cuts through it. When the liquid metal encounters the water-cooled steel electrodes it quickly melts through them, and the resulting explosion fairly lifts the roof off the furnace.

If only a dry metallic plate is used, the steel simply goes through the bottom and into the pit under the furnace. In one American steel foundry that tried this design, break-throughs were so frequent that the conducting-bottom feature was abandoned after a few months' operation. Any open-hearth operator could have told the furnace designers that it is hard enough to keep a refractory bottom in good shape, without attempting to make it a resistance element as well as an impervious basin to hold the steel.

Other engineers hit upon the idea of striking the arc above the charge between the ends of three electrodes and heating the metal entirely by radiant heat. Sometimes the three electrodes were spaced 120° apart around a cylindrical furnace and sloped downward at a slight angle. In other cases two electrodes were horizontal, the third vertical. In furnaces of this type it was next to impossible to keep the heat from striking upward as well as downward, and no refractory material would long withstand the extreme temperatures to which the roof was subjected. Breakage of the electrodes, too, was constant; even when suspended vertically electrodes sometimes break, and when used in a horizontal position they simply don't have a chance.

Accompanying illustrations show typical modern arc furnaces. The body of the furnace is enclosed in a cylindrical steel shell, pivoted or

(*Continued on page* 320)



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Bulletin No. 117—Melting Practice for Copper-Base Alloys

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Bulletin No. 123—Practical Steps for Reducing Porosity in Non-Ferrous Castings

Bulletin No. 126—Effect of Magnesium on Aluminum-Copper-Silicon Casting Alloys

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Company Name_____

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City_____ Zone_____ State_____

(*Continued from page* 318)

mounted on rockers so as to be tipped forward and backward, and provided with three vertical electrodes, each connected to one phase of a three-phase alternating current circuit. Though a domed roof is not as easy or cheap to build as a rectangular arched one, the cylindrical shape is preferred because the working chamber can be heated uniformly, since the walls are at approximately equal distances from the three arcs. The furnace roof is built in a separate steel ring and rests upon the side walls.

The electrodes are suspended from horizontal arms attached to structural steel masts, and extend through openings in the furnace roof, provided with water-cooled rings that fit them quite closely. Clamps that support the electrodes are also water-cooled, and can be readily and quickly opened to allow the electrodes to be slipped down when they have burned off too short to reach the bath. The current is carried to the electrodes through braided copper wire cables leading from the transformer. The latter is provided with suitable switches so that taps may be changed quickly to vary the voltage in the current fed to the electrodes.

Masts Raised or Lowered

The masts are so mounted that the operator can raise and lower them at will, the exact design varying in different makes of furnace. Rheostats are provided to make small changes in the voltage, and hence the arc length at each electrode. Automatic regulators, of which there are several different types, keep the arcs constant by making small adjustments in the position of the electrodes. Current in the arcs is of quite low voltage and high amperage. The no-load voltages are most frequently around 200 for the high tap, 160 for the intermediate, and 120 for the low.

The furnace usually has a "working" door on each side and a tap-hole and spout at the front. Formerly the charge was put in through the doors, but in most steel foundries today, the roof can be quickly lifted off the body of the furnace and moved to one side. The entire charge, contained in a drop-bottom bucket, is then lowered into position with the overhead crane. In this way the furnace can be charged, the roof replaced and the current turned on, in two or three minutes, whereas it usually required 15 minutes to ½-hr or more to feed the metal through the doors.

The electrodes are made either of graphite or of amorphous carbon.

(*Continued on page* 322)

Visit Booth 401-403 where a charming Miss awaits to adorn your lapel with our traditional convention carnation.

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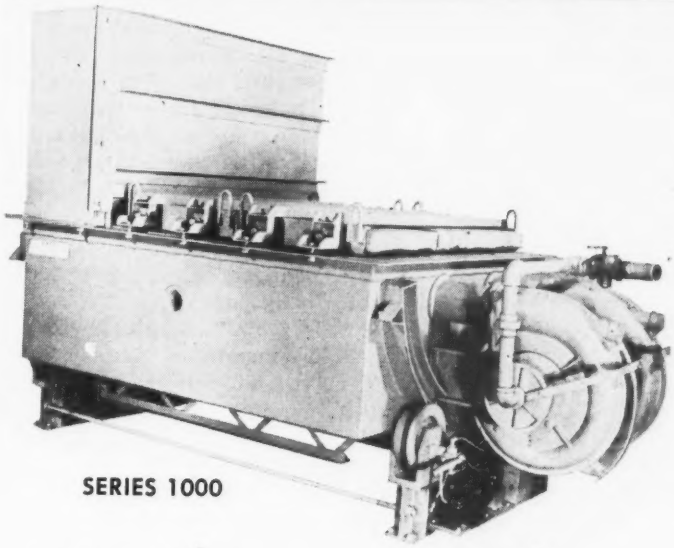
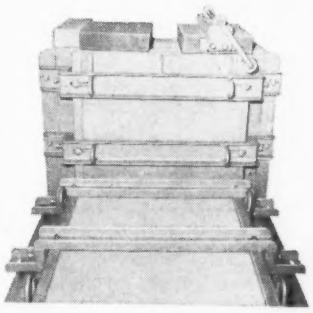


SERIES 1000

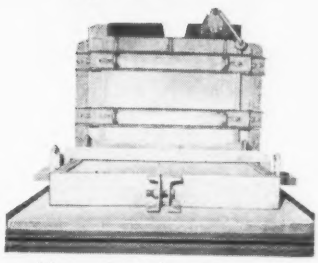
REDA

REFLECTING TYPE
STACK LOADING
DIRECT FIRED
MELTING

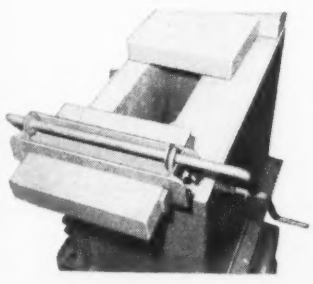
FURNACE



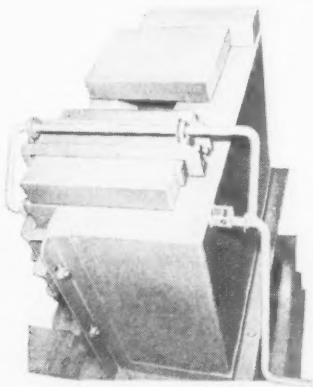
One-piece stack front and one-piece roof. Provides easy access to lining for maintenance.



View of single piece stack front, with swinging stack cover in operating position.



Swinging Stack Cover — Open Position and showing ease with which furnace may be charged.



Swinging Stack Cover—Closed Position. This position when furnace is in operation.

SERIES	CHARGE		MELT CAP./HR.	
	IRON	BRONZE	IRON	BRONZE
400	400#	450#	800#	1350#
550	550#	625#	1100#	1875#
1000	1000#	1125#	2000#	3375#
2000	2000#	2250#	4000#	6750#

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Performance and economy are the keynotes of the new Reda Reflecting Type Direct Fired Melting Furnace for ferrous and non-ferrous metals. Advantages sought by all foundry owners, both large and small, are inherent in these cleanly designed, highly efficient furnaces.

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7. Will best comply with health requirements of intra-city installation.

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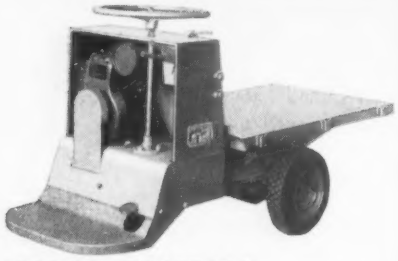

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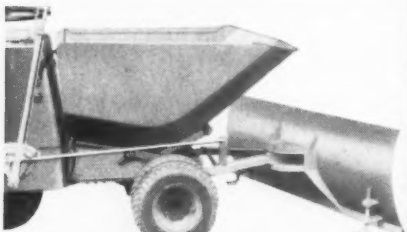

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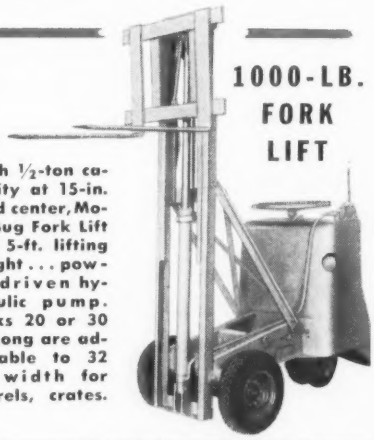

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KWIK-MIX (Koehring Subsidiary) "NO PUSH — NO PULL" **Moto-Bug**®

(*Continued from page* 320)

Because their electrical conductivity is higher, graphite electrodes are smaller for a given current carrying capacity than those of amorphous carbon, and are somewhat stronger, but more expensive. In the early days of electric furnace operation, they were also of more even size and roundness, and therefore could be made to fit closer to the roof cooling rings. More modern manufacturing methods, however, have largely eliminated this difference.

The electrodes are made with tapered threaded recesses at each end, into which graphite or carbon connecting plugs are screwed. As each electrode grows short, a new one is attached above it, and the suspended end of the old one can thus be almost completely used up. At times, however, it will break off, especially when lowered against an uneven charge of scrap. When this happens, the broken piece should be dragged out of the furnace at once, otherwise the charge will absorb large amounts of carbon from it.

Large and Small Furnaces

Arc furnaces built to hold 75 to 150 tons of metal or even more, are commonly installed in big modern steel plants. Steel foundries that require large heats of steel, however, prefer the open-hearth process, and only those making comparatively small castings use electric furnaces. Six, or occasionally 10 tons, is the maximum capacity usually installed, and many foundries operate furnaces holding only 2 or 3 tons, or even less.

The big steel mill furnaces are run very much as open hearths are, with at least a considerable proportion of liquid metal in the charge. Naturally, when operated in this manner, large furnaces are more economical than small ones. In steel foundry practice, however, only cold steel scrap is charged, and in furnaces of large capacity it is a slow and awkward matter to melt down all-scrap heats.

Electric furnace steel, too, is used chiefly for light and medium weight castings, which must be poured with very hot metal, and to pour a large heat into small molds would take so long that the steel would grow too cold to "run" the castings. Finally, it is more economical of floor space to set up and close only enough small molds to take a light heat of steel, and to pour at short intervals, than to provide room for the much greater number of molds required to use the steel from a big furnace.

(*Continued on page* 327)

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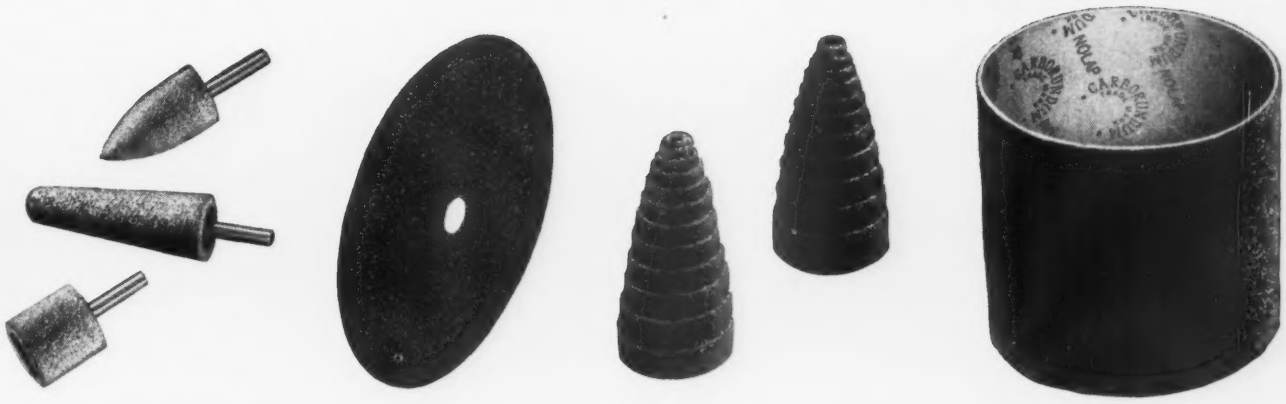

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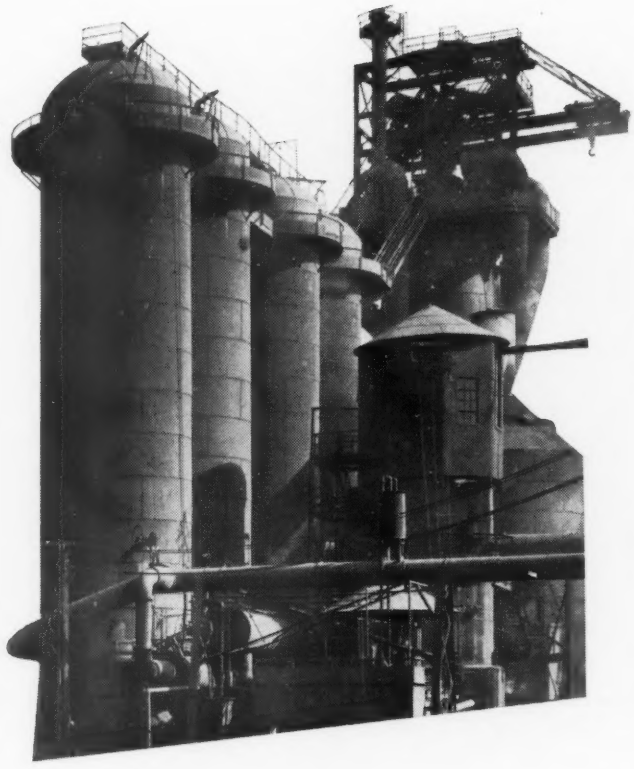

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(*Continued from page* 322)

The cost of installing a large electric furnace, with its transformer and electrical equipment, is so high that it must be kept operating steadily at full capacity, and shut-downs are extremely costly. Under steel foundry conditions, therefore, large electric furnaces would be at a disadvantage in comparison with open-hearth units of similar daily capacity.

Originally, electric furnaces were operated "basic," with a magnesite bottom and a slag composed largely of lime. At the very high temperatures readily attained in the electric furnace, slags could be kept liquid when they contained much more lime and less metallic oxides than do basic open-hearth slags. As a result, the steel could be deoxidized, and its phosphorus and sulphur content reduced, to an extent unattainable in any other process. Naturally, the electric furnace was at first hailed as the solution to all the steelmaker's troubles, and was quickly adopted by a number of progressive steel foundries. As will be described in detail later, however, the operating practice originally followed has been modified greatly in most steel foundries.

Lining the Furnace

The basic electric furnace is lined with a layer of clay brick laid flat against the bottom of the shell, followed by several courses of magnesite or chrome-magnesite brick, which extend up the sides to a point a little above the slag line. The walls are usually of metal-case, magnesite or chrome-magnesite brick, though some operators prefer to use silica brick for the upper portion of the walls, which do not come in direct contact with the slag. The door arches are generally laid with silica brick, especially if the furnace is to be run on single turn. The repeated heating and cooling of the furnace structure when operating only part time causes magnesite brick arches to spall and crumble rapidly.

When the upper portions of the walls are laid with silica brick, it is advisable to make the entire back portion on the side opposite the spout, of basic material. This spot usually wears away faster then the rest of the walls, and requires refractories with the highest possible fusion and softening points.

The furnace roof is practically always formed of silica brick or shaped silica blocks, since this material has greater strength at high temperature than any other refractory. It is generally more economical to buy special silica blocks designed for the purpose, because though somewhat more expensive than regular shapes, they can be laid at far less expense. A wooden form is kept on hand, and the roof built on it. To avoid shut-downs, two roof-rings are provided for each furnace, and a spare roof is made up as soon as a new one is put in place.

As the roof is laid in a solid steel ring, it is impossible to take care of the expansion of the silica blocks by loosening tie-rods, as is done in heating up an open-hearth furnace. Wooden shims, therefore, are laid between the blocks, to allow for an expansion of ⅛ to 3/16-in. per ft.

The bottom proper is composed of magnesite or one of the new proprietary basic materials. Formerly standard practice was to sinter the bottoms in place, but today they are more often rammed up cold. To set a sintered bottom, three pieces of old electrodes are laid on the bottom bricks, their ends meeting at the center of the furnace, and the electrodes are lowered against them. Arcs are thus formed under each electrode. The furnace is preferably first warmed up with a wood fire, since it is difficult to heat it slowly enough at first with the heat from the arcs. When brought up to sintering temperature, layers of an inch or two of magnesite mixed with about 10 per cent basic open-hearth slag are shoveled in and sintered, just as in building up an open hearth bot-

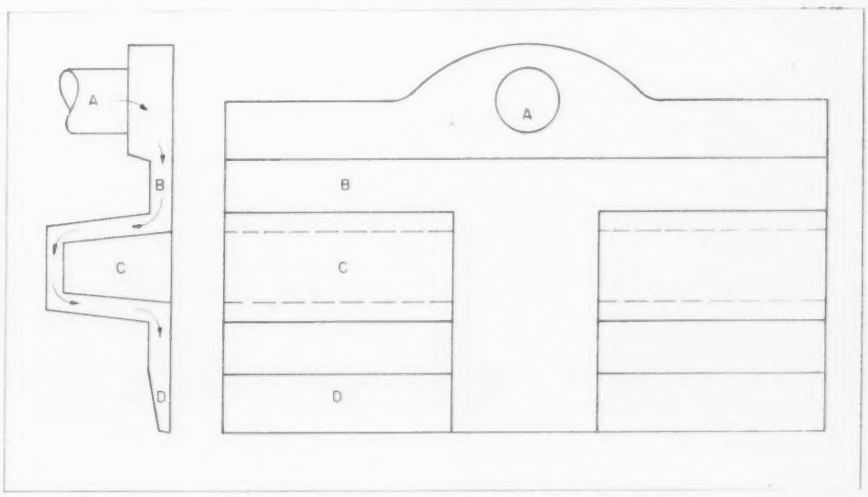
Skim Gate Designed To Trap Foreign Material

By O. K. YORSTON, Coast Foundry Co. Ltd., Vancouver, B. C.

WHILE engaged over a period of many years in producing stove plate, pistons and other gray iron and aluminum castings, the author has seen and used numerous types of gates designed to prevent the inclusion of foreign material with the metal entering the mold. Some were fairly satisfactory. Others answered the purpose for which they were intended, but were so clumsy and complicated that they found no place in a production schedule where time is measured in seconds. A third variety, based on unsound theories, never got beyond the experimental stage.

The gate pattern shown in the accompanying illustration was designed and constructed over a year ago and has been in constant use with consistently satisfactory results. The example shown has two gate inlets *D*, but others in use have one, two, three, four or more gate passages depending on the shape and size of the pattern to which they are attached. On plate patterns the gate is an integral part of the pattern. On loose patterns the gate is placed on the rollover board and in contact with the pattern. The gate pattern also may be adjusted to deliver metal either above or below the joint parting line in the mold.

Any slag or sand carried down the sprue *A* with the first iron from the ladle passes first through the restricted passage *B* and then has to rise over the dam or barrier *C*, as shown by the arrows in the sectional view at the left of the illustration. Before the iron can run over the dam it backs the metal to the runner and sprue *A*, thus trapping any foreign material and preventing it from entering the mold. The gate pattern shown forms the green sand dam *C*, but if for any reason the green sand is not considered sufficiently resistant to the flowing stream, a dry sand core may be employed.



Gate pattern for forming green sand dam to trap foreign material

tom. At intervals, the pieces of electrode are moved about with bars so that magnesite can be shoveled in under them.

Most operators today prefer to ram in a bottom with magnesite or one of the proprietary materials, mixed with tar or some other binder. After the bottom is built up to the required thickness, the furnace is partly filled with coke, and arcs formed between this material and the electrodes. The heat is kept on until the rammed material is properly sintered. It takes less time to make up a bottom in this way, and it has been found that bottoms rammed in cold give as satisfactory service as sintered ones.

After the magnesite is well set, a "wash" heat may be melted down and a fairly fluid slag formed on it with lime, iron ore and a little silica sand. This slag is splashed up against the banks to complete the setting of the magnesite, and the steel is then poured out and pigged for remelting. The progress of sintering the magnesite, before the wash heat is put in, is observed by poking it with bars to see when it begins to stick together in one homogeneous mass.

In regular operation, after each heat is poured into the ladle, all electrodes are hoisted up out of the way, the doors are opened, and the bottom along the slag line is patched by shoveling in bottom material, exactly as in open hearth work. If there are holes in the bottom in which steel has lodged, the metal must be splashed out of them with rabbles, before patching the hole. Failure to do this results in the hole rapidly growing larger on successive heats, and finally to a break-out into the pit under the furnace.

In a basic electric furnace, scrap containing comparatively high percentages of phosphorus and sulphur can be melted and converted into high-quality steel, low in both of those elements. It is also possible to utilize material that open-hearth shops do not want, such as light sheet clippings, machine shop turnings, and so on. In fact, when electric furnaces were first introduced, some advocates of the process published cost estimates based upon melting only the very cheapest grades of scrap, and inexperienced operators attempted to run their furnaces in this way in regular production.

Sometimes False Economy

It was soon found, however, that to melt down large amounts of light, bulky material so prolonged the time per heat, and resulted in such high melting losses, as to make it uneconomical to operate in this manner. If the charge is really high in phosphorus and sulphur, too, the extra time, power and slag-forming materials required to eliminate these impurities far more than offset the saving through using cheap raw materials in place of better grades.

In view of the availability in this country of large amounts of fairly heavy scrap containing only moderately high percentages of phosphorus and sulphur, operators of basic electric furnaces mostly melt charges containing not over 0.10 per cent P and 0.08 per cent S, and usually considerably less. As in any process used in steel foundries, an average of about 40 per cent of each charge must consist of heads, gates and defective castings. With this, perhaps another 30 per cent of fairly heavy purchased scrap is used, the remainder being light material.

The loss of metalloids in melting a charge in the electric furnace is nowhere near as great as in the open-hearth process. However, the steel absorbs hydrogen and nitrogen as it melts, so that a carbon boil is de-

(*Continued on page* 330)

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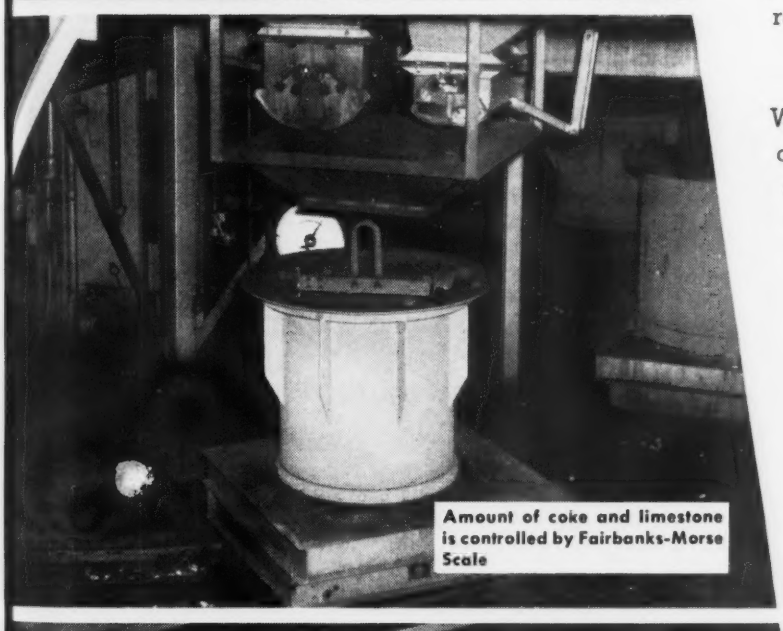

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(*Continued from page 328*)

sirable to eliminate these dissolved gases. To provide the necessary carbon for this purpose, pig iron amounting to about 2 or 3 per cent of the total weight of the charge, or an equivalent amount of high-carbon steel scrap, may be melted with the other materials. As in open-hearth work, steel-foundry electric furnace operators have of late years utilized crushed pieces of old electrodes instead of pig iron to add the required amount of carbon to the bath.

It is desirable to have successive heats melt down at approximately the same carbon content, so that they can be "worked" in the same way, with approximately uniform additions of iron ore or mill scale. The proportions of shop scrap and of light and heavy purchased scrap in each heat, therefore, should be varied as little as possible. For the same reason, when crushed electrodes are used, they should be broken uniformly to hickory nut size, preferably in a small crusher, so that they will be quickly and evenly absorbed in the melted bath.

The slag-making materials for basic-electric furnace operation are burned lime, fluorspar, silica sand and powdered coke or graphite. Sometimes limestone is used in place of lime, but since the latter shortens the time required to make a heat it is greatly preferred. Only high-grade metallurgical lime, containing at least 95 per cent CaO, should be used, and it must be kept dry and exposed to the air as little as possible, because the steel rapidly picks up hydrogen from lime or other materials in the charge that have been allowed to absorb too much moisture.

Fluorspar of the same grade as that utilized in open-hearth operation, is used in the electric furnace, to increase the fluidity of the slag without decreasing its basicity. Silica sand will serve the same purpose, and is sometimes substituted for part of the fluorspar, but as silica increases fluidity only at a considerable sacrifice of basicity, it should be used in limited quantities, if at all.

In charging a furnace by hand, the heavy scrap is placed first, and as far as possible is located immediately under the electrodes, so that there will be no delay in "making contact" and getting the arcs established. The charge should be well compacted, so as to carry the current freely, the lighter material being placed above the heavy scrap, and around the sides of the hearth. When the furnace has a movable roof and the charge is dumped in all at once, an effort should be made to set the scrap in the charging bucket so that the heavy material will lie in a mass within the area covered by the electrodes. Some of the required lime may be shoveled in with the charge, but as a rule it is added at intervals after the metal begins to melt.

Upon lowering the electrodes against the heap of scrap and turning on the current, the arcs will at first be made and broken repeatedly, and it is usually necessary for one of the operators to stand by the manual controls, and raise or lower the electrodes as required to maintain contact. One of the helpers may also have to move some of the scrap about with bars, for the same purpose. For some minutes after the power is turned on, the sound of the arcs as they break and reform, suggests the snorts of a fair-sized drove of drowning hogs.

Once the arcs are well established, full current is turned on, and the electrodes melt their way down through the heap of scrap nearly to the bottom of the hearth, and then work back upward as the pools of metal

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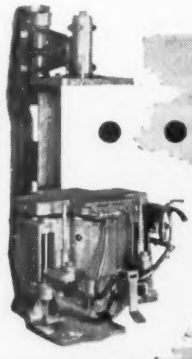

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under them grow deeper. The lime, which usually amounts to 1½ or 2 per cent of the weight of the metallic charge, is shoveled into the furnace in several batches, and should be deposited upon the growing pools of molten metal. After the heap is somewhat more than half melted, it is often necessary to hasten the melting of the rest by prying the light material off the banks and into the center of the furnace. It is this chore that makes it so slow and tedious to melt charges containing much light scrap, in furnaces of large capacity. As soon as the whole charge is melted, the current is reduced, to keep the temperature from rising too high.

A small test block then is poured with the spoon, cooled, and broken in half, one piece going to the laboratory for a check on the carbon content. Most melters also estimate the carbon by the appearance of the fracture, and in a great many plants today the carbon is checked with one of the devices that measure the magnetic properties of a small bar poured in a cast iron mold. These instruments are provided with scales reading directly in terms of carbon content. They require special calibration, however, for use in making low-alloy steels, and for high-alloy materials are of little if any, assistance.

The slag formed on the bath consists chiefly of the CaO of the burned lime, MgO absorbed from the bottom, and SiO_2, MnO and FeO resulting from the oxidation of silicon, manganese and iron in melting, plus the FeO of the rust on the scrap. Unless a good deal of the scrap is quite rusty, there will not be enough FeO to create a vigorous boil, and iron ore or mill scale must be added for that purpose. Occasionally a little fluorspar is required also, to increase the fluidity of the slag. There will usually be from 40 to 50 per cent CaO, 12 to 20 per cent FeO, about 10 to 15 per cent SiO_2 and smaller amounts of iron and manganese oxides, in a normal basic slag.

The function of the slag is first to make the bath boil by oxidizing part of the carbon, and second to absorb phosphorus as P_2O_5. To promote the oxidation and absorption of phosphorus, the slag should contain from 10 to 20 per cent FeO and MnO, taken together, and between 45 and 70 per cent CaO and MgO. Such a slag is quite black and fluid, and if the temperature is kept comparatively low, will absorb within a short time after the boil subsides, a large proportion of the phosphorus from a charge containing a normal amount of that element. With higher phosphorus charges, it may be necessary to allow the slag to remain on the metal for 20 minutes to half an hour longer. In any event, it is desirable to maintain a vigorous boil for at least 15 or 20 minutes, to eliminate dissolved gases from the metal. At the end of the boil, another sample is poured and sent to the laboratory for a check on the carbon and silicon content.

With charges containing over 0.04 per cent P, it is necessary to remove the first slag, since if it were left in the furnace the phosphorus would be reduced from it by the deoxidizing additions and so re-enter the steel. To do this, the power is shut off, the electrodes raised, and the furnace tilted until the slag runs out through the tap-hole and spout. In thus slagging off, the helpers move the excess slag toward the front of the furnace with bars and rabbles, somewhat as dairymaids once skimmed cream from pans of milk. To complete the job, it is generally necessary to thicken the slag by

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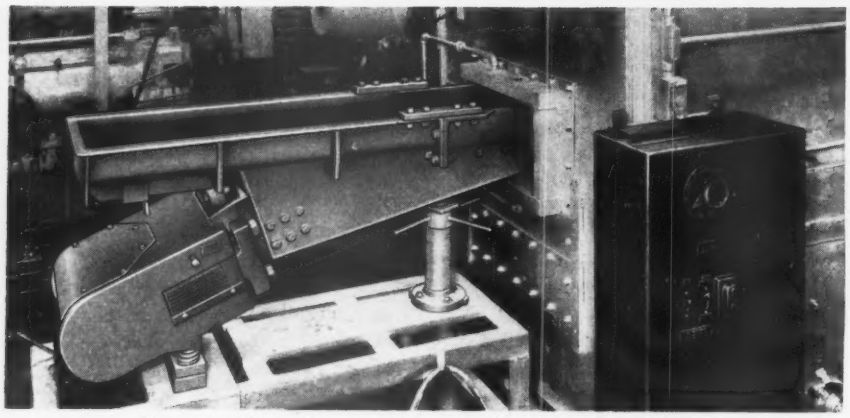

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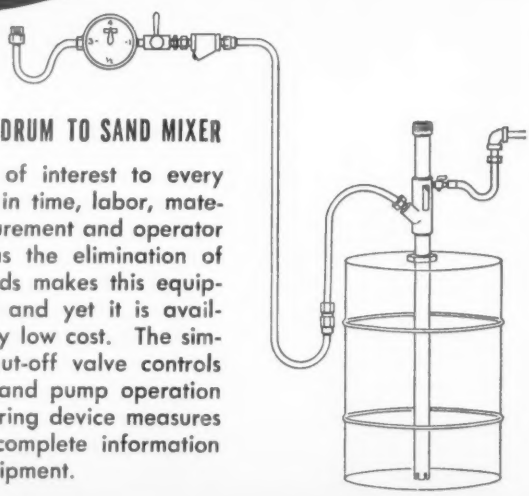

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spreading a little dry lime over the surface of the bath with shovels. When the bulk of the slag has been removed, the furnace is tilted back, the current turned on again, and the material for the second, deoxidizing slag is charged.

At the end of the boil, the Mn of the bath generally will be between 0.05 and 0.10 per cent, and the Si from 0.01 to 0.05 per cent. With normal charges, the C will be from 0.03 to 0.07 per cent; it may reach 0.10 or even 0.20 per cent, when the initial carbon content was high. Before adding slag-making material, the usual practice is to bring the carbon up to a little under that desired in the finished steel, by additions of low-phosphorus pig iron, or crushed electrodes.

Burned lime and fluorspar, in the proportion of about 8 to 1, are then shoveled into the furnace in one or more batches. These materials generally are mixed on the floor ahead of time, so as to be ready when wanted. Silica sand is sometimes substituted for part of the fluorspar in the first batch, so as to obtain a fusible slag as quickly as possible. Pulverized petroleum coke is added to the later batches, to create reducing conditions and prevent any oxidation of the carbon in the bath. As the first batches melt, more are added until the proper volume of slag is obtained.

When the slag is melted, the power is reduced and successive small amounts of pulverized coke are spread as evenly as possible over the bath. The slag tends to foam when the carbon is first added, and its color changes progressively from black to brown, then to a light greenish brown,

(*Continued on page* 334)

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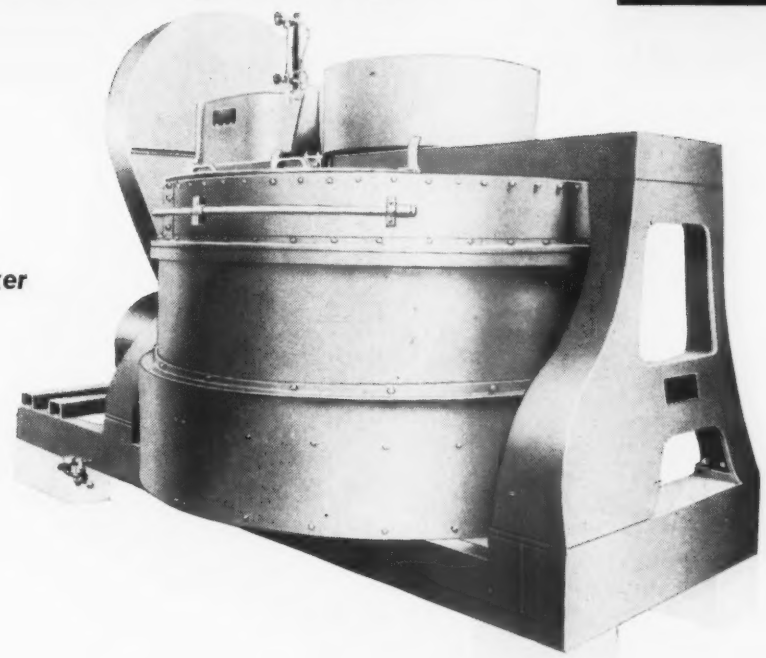

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(*Continued from page* 332)

and finally to grayish white. Samples of the slag are taken at regular intervals by thrusting a bar into the bath, or from what adheres to the handle of the test spoon, and are cooled in water and broken to see the color of the fracture.

When the metallic oxides in it have been largely eliminated, the slag as it cools will crumble to a grayish-white powder. If further additions of coke are made, calcium carbide is formed by reaction between the coke and the CaO of the slag, and the color of the slag changes to dark gray. A strong odor of acetylene is noticeable in the steam rising from these carbide-containing slags, which crumble to powder as they cool, in the same way as the white ones.

The oxides of iron and manganese are reduced from the slag and returned to the metal by the usual reactions,

$$FeO + C = CO + Fe$$
$$MnO + C = CO + Mn$$

The deoxidized slag, which then consists chiefly of lime, fluorspar and a small amount of silica, absorbs sulphur from the steel, in the form of CaS. The exact reactions by which this compound is formed are not known, but the conditions that result in maximum sulphur elimination[1] are that the slag be highly basic and reducing, be fluid and hot and (probably) that it contain fluorspar. The latter increases the activity of the slag by making it more fluid, and at the same time keeping it highly basic. With good practice, a considerable proportion of the sulphur can be eliminated from the charge.

The progress of the deoxidation of the slag is watched carefully, and when a white or gray color has been attained, the heat is ready to be finished. Generally the refining slag is in the furnace from 1 to 1½ hr; half of this is taken up in forming the slag, the rest in deoxidizing it. The required amounts of manganese, silicon and carbon then are added in the form of ferroalloys, and when they are melted and the steel brought to the proper temperature, the heat is poured into the ladle.

In taking samples of the metal, the long-handled spoon or test cup is first dipped only into the slag and when thoroughly coated, is thrust deeply into the bath and quickly withdrawn. When the steel first is melted, and comparatively cool, it should be rabbled with a bar before taking the test, since it is apt to stratify badly and to differ in composition from one level to another. This is particularly true when an over-size heat is being

(*Concluded on page* 336)

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(*Concluded from page 334*)

made. On samples taken during the deoxidation of the second slag this precaution is not so necessary.

When the heat is ready to tap, its temperature is judged by a sample taken in a well-slagged spoon, which should always be cold when put into the slag, and "slagged" for the same length of time, heat after heat. The slag is skimmed off the metal in the spoon, and the time required for it to freeze over at the surface is taken, preferably with a stop-watch. The portable optical pyrometer may also be used to measure the temperature, but it must be read quickly, since the spoonful of steel cools rapidly. Another spoonful is taken and poured into the test block mold. With proper deoxidation, the steel in this test should lie quietly and freeze over with a smooth flat surface.

Fluidity Is Lower

When steel is made as described above, it probably contains no more dissolved oxygen than the amount that is in equilibrium with the carbon at the existing temperature, and its purity is higher than that of steel made by any other method. However, its fluidity is definitely lower than that of less thoroughly deoxidized metal. It is thought that for maximum fluidity, steel should contain somewhat more dissolved oxygen than the amount that is in equilibrium with the carbon; just how much more, however, is not yet known. Because of its lack of fluidity, steel made by the two-slag method and thoroughly deoxidized, is almost always handled in a bottom pour ladle with stopper and nozzle, and is seldom if ever poured with "shank" ladles. When attempts are made to shank it into very light castings, it soon becomes too cold to run the molds.

In the accompanying table is shown the log of a two-slag basic heat, which melted low in carbon, and therefore was not boiled in accordance with more usual practice. It will be noted that immediately after slagging off, the carbon was raised by an addition of pulverized carbonaceous material, and at the same time part of the required manganese and silicon were added as ferroalloys. The use of small amounts of powdered ferrosilicon to reinforce the effect of the powdered carbon in deoxidizing slag is also illustrated. The build-up of the deoxidizing slag from lime, fluorspar and sand (in the first addition) is in accordance with standard basic practice.

(*To be continued next month*)

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1. C. W. Briggs, *Metallurgy of Steel Castings*, page 59.

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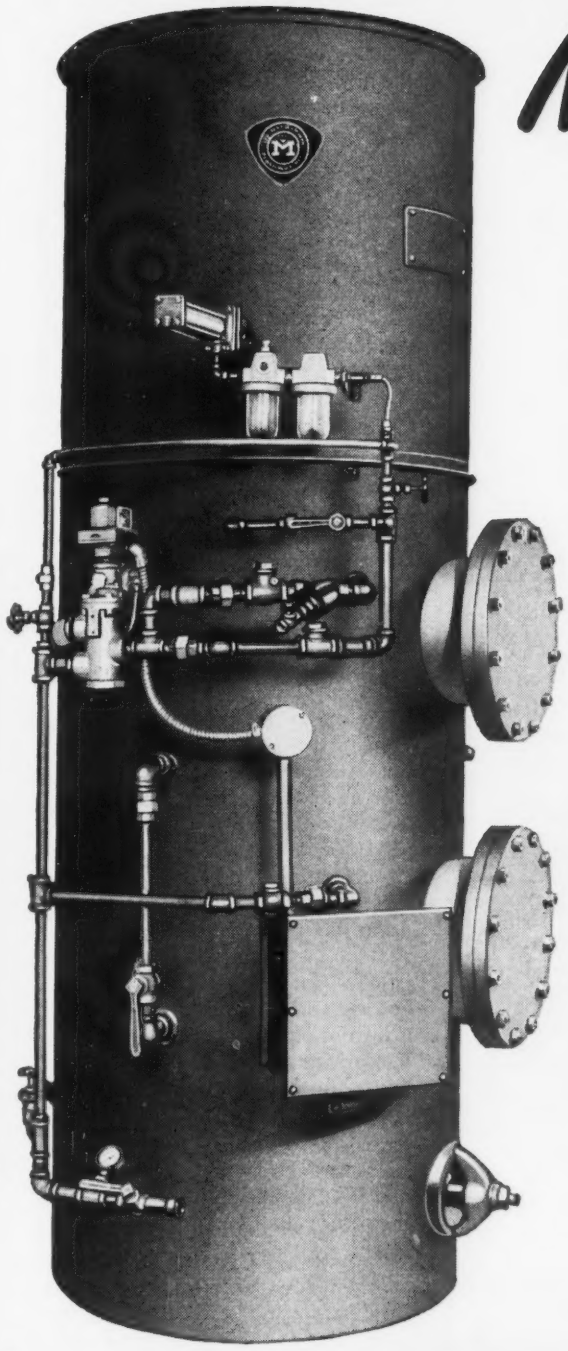

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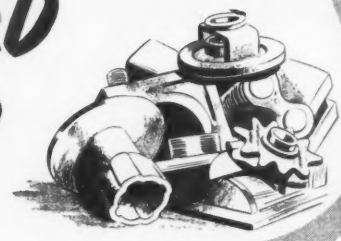

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ASTM Committees Review Many Specifications

During the annual Spring Meeting and Committee Week of the American Society for Testing Materials held in Cleveland, Mar. 3-7 Committee A-3 on Cast Iron discussed the chill or wedge test, chilled iron, and cast iron for elevated temperature use.

In the case of the wedge test a proposed design and dimensional sequence of test specimens with recommended procedures for their preparation, test and interpretation have been prepared. Test specimens of chilled iron have been designed for breaking without machining so that influence of composition and cooling rate on mechanical properties of the material may be established. Specifications for cast irons for elevated temperature use in pressure vessel as well as firebox service (A 278 and A 319) are to be re-surveyed with a view of raising or limiting sulphur and phosphorus contents. Current specifications for pipe, fittings and valves, general castings, pig iron, etc., were re-affirmed for further usage.

Committee A-7 on Malleable Iron recommended that standard specifications for malleable iron castings (A 47-48) be revised so that test lugs would be required only if specified by the purchaser or if their use was standard practice as in the case of railroad castings. Note was taken of the approval for publication by the society of the tentative specifications for malleable iron flanges, pipe fittings and valve parts for railroad, marine and other heavy duty service (A 338-51T), and withdrawal of tentative specification A 277-44T. Some interesting work on impact properties of malleable iron is being carried out by various members with the idea of developing new types of test specimens as well as disclosing some further information on impact properties of the material.

Committee A-10 on Iron-Chromium-Nickel and Related Alloys has completed a proposed specification for iron-chromium and iron-chromium-nickel alloy tubular centrifugal castings for general applications.

Committee E-4 on Metallography recommended that tentative methods for estimating the average ferrite grain size of low-carbon steels (E 89-50T) and tentative recommended practice for determining inclusion content of steel (E 45-46T) be advanced to formal standards. Work is nearing completion on a glossary of definitions of metallographic terms.

(*Concluded on page* 340)

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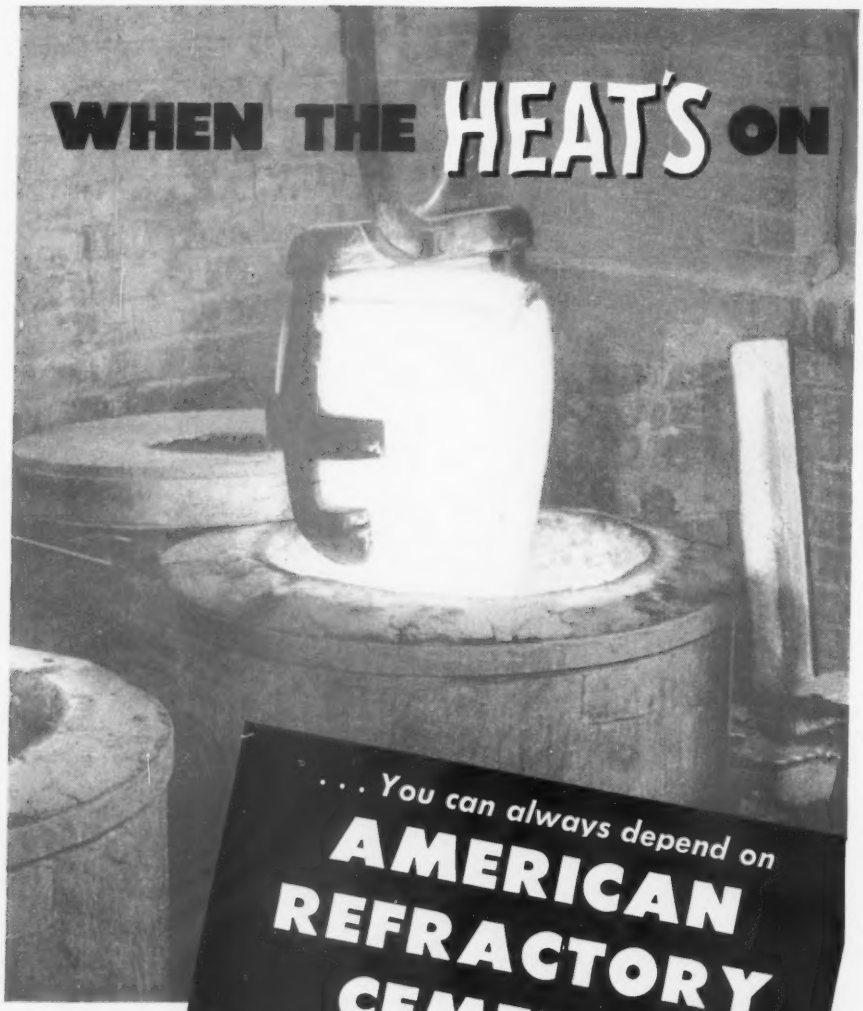

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(*Concluded from page* 338)

and a program for bringing the tentative methods of preparation of metallographic specimens (E 3-46T) into line with present practice is in the formative stage.

Committee E-7 on Non-Destructive Testing stated that comparison radiographs for steel welds are in final stages of preparation, and a recommended practice for radiographic testing is being considered. It also has developed calibration blocks for ultrasonic testing, a recommended color code for searching units, and reflection and resonance methods for testing. Other projects under way include methods of magnetic particle testing and minimum requirements for all the various features of radiographic technique, including qualification of technicians and interpreters, preparation of specimen surface, penetrameters, number of radiographs, and identification of areas and films, as well as recording results.

British Institute of Metals Meets

Annual general meeting of the Institute of Metals (British) was held in London, Mar. 25-27. The evening of Mar. 24, the "May" Lecture was delivered at the Royal Institution by Dr. J. J. P. Staudinger on "The Place of Plastics in the Order of Matter."

The business meeting took place at the Park Lane Hotel, London, the morning of Mar. 25, with Prof. A. J. Murphy, president, in the chair. The secretary announced that the membership of the Institute had reached 3882. He also announced that the autumn meeting would be held at Oxford from Sept. 15-19.

Appointment of the following officers of the institute was then announced: President, Dr. C. J. Smithells, director of research, British Aluminium Co. Ltd., Gerrards Cross, Bucks.; vice presidents, G. L. Bailey, director, British Nonferrous Research Association, London, Dr. S. F. Dorey, chief engineer surveyor, Lloyd's Register of Shipping, London; honorary treasurer, E. H. Jones, director and general manager (Bristol), Capper Pass & Son Ltd., Bristol. Prof. F. C. Thompson, will serve as senior vice president for 1952-53, and assumed that office on Mar. 25, 1952.

Awards of the medals of the institute were then announced as follows:

The Institute of Metals Medal to William Sydney Robinson, until recently president of the Consolidated Zinc Corp., Ltd., in recognition of

(*Concluded on page* 342)

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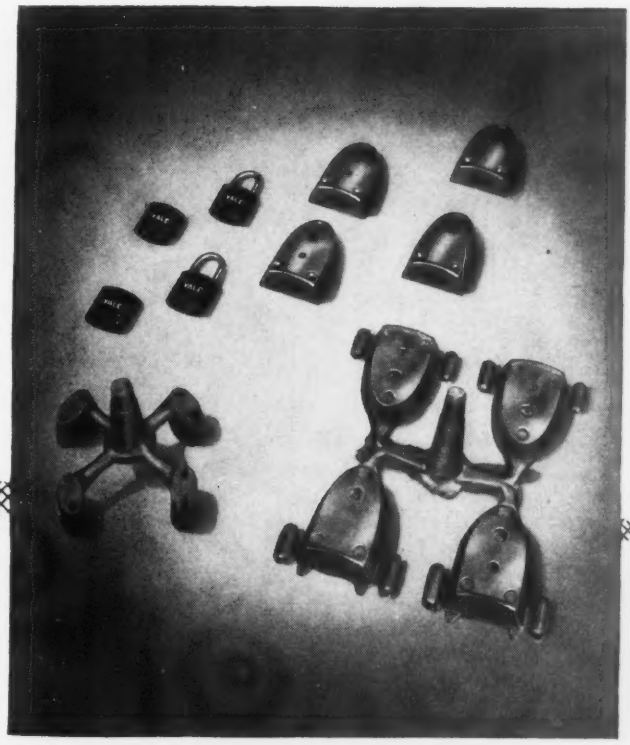

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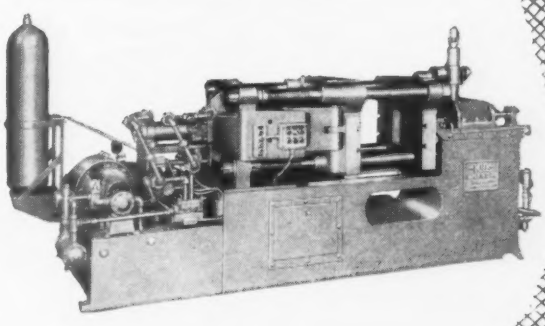

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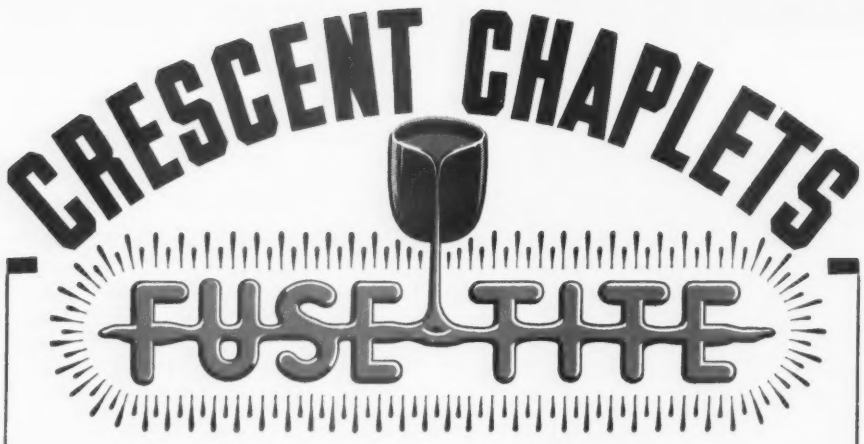

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(*Concluded from page* 340)

his outstanding services to the nonferrous metal industries in developing the Australian zinc-lead industry and the British zinc industry.

The W. H. A. Robertson Medal to Cyril Ernest Davies, for his paper on "The Cold-Rolling of Nonferrous Metals in Sheet and Strip Form", published in the institute's *Journal*, 1950-51 vol. 78, pp. 501-536.

The Rosenhain Medal to Prof. Andre Guinier, Conservatoire National des Arts et Metiers, Paris, in recognition of his outstanding contributions in the field of physical metallurgy, particularly in connection with precipitation phenomena.

Professor Murphy then inducted the new president, Dr. C. J. Smithells, who since 1944 has been director of research of the British Aluminium Co. Ltd.

Featuring the technical program of the meeting, was a day-long symposium on "Equipment for the Thermal Treatment of Nonferrous Metals and Alloys." This covered seven papers dealing with the heat treating plant and equipment for ingots and processed metals and alloys.

About twenty papers of a more scientific nature were presented at other sessions of the meeting.

Versatile Coreboxes

(*Concluded from page* 155)

length of the core print is also important. The following table lists horizontal core print dimensions which have been found to be adequate for most applications:

Diameter Core	Core Print Length
Less than 2 in.	2 in.
2 to 5 in.	At least equal to core print diameter
Greater than 5 in.	6 in. (minimum)

The core prints are split longitudinally in half since one half is rammed in the cope and the other in the drag.

Because of the inherent advantages of the simplified practices described in this article, other foundries may find it possible to adapt, modify, or improve them to suit their individual needs.

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Wood Patternmaking, by Herbert J. McCaslin, published by McGraw-Hill Book Co., New York.

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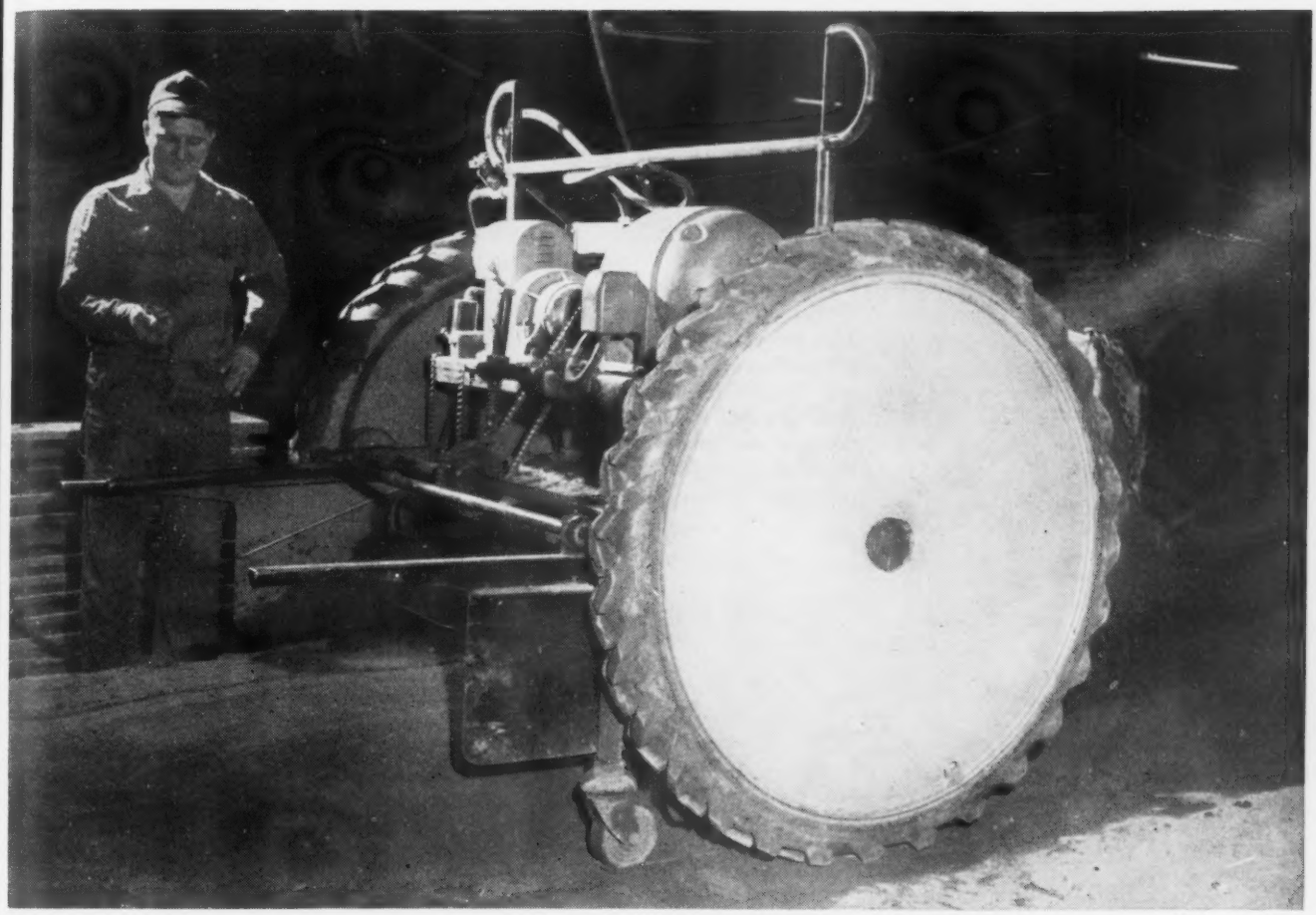


ANOTHER VALUABLE ADDED FEATURE PLACES THIS MOST EFFICIENT SAND CONDITIONER IN A CLASS BY ITSELF

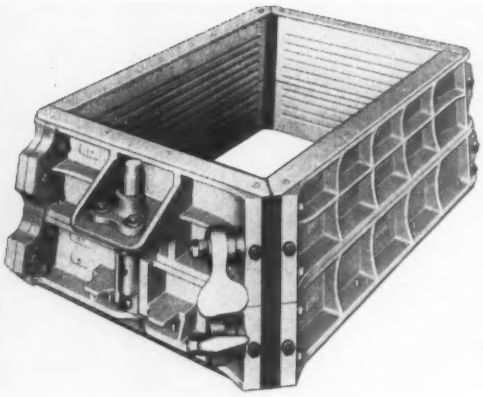
YOU WILL BE WELCOME AT SPACE 1832-1836

●

"*The Moulders' Friend*" Sand Conditioning Equipment, Dallas City, Illinois

New EQUIPMENT and Supplies

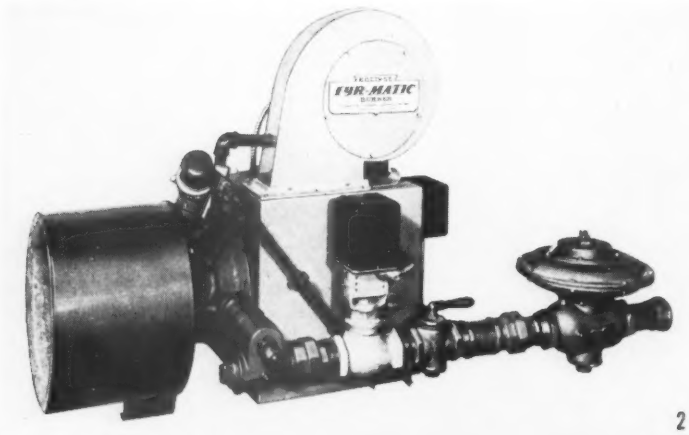
For Additional Information on these Items Use Reply Card—Page 347



1

(1)—Magnesium Flasks: Fremont Flask Co., Fremont, O.—New magnesium slip flasks have replaceable live rubber corner inserts which completely cover corner gaps so no sand can lodge in the corners. The rubber also serves to spring the flask open when cam-operated corner locks are released. All standard flask sizes are available with either 4 or 5 degree tapered sides. Top and bottom flanges are steel faced. Inside side surfaces and flanges are accurately machined. Grooved steel pins and guides are standard, but other styles are available upon request. Light weight of the flasks, one third less than aluminum, make them easy to handle with less worker fatigue.

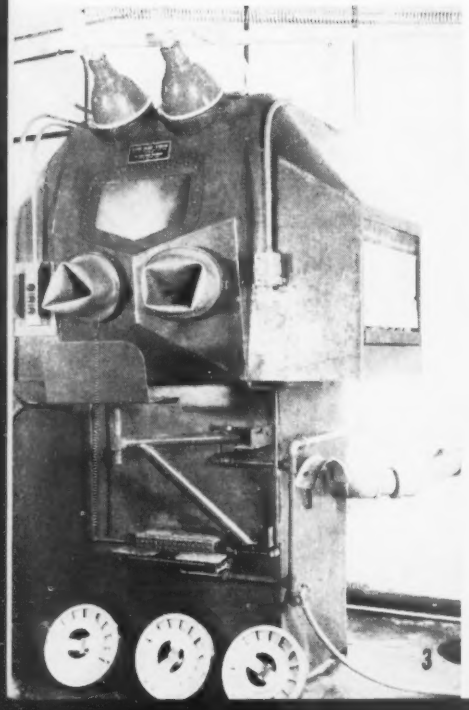
For More Details Circle No. 1—Page 347



2

(2)—Burner: Eclipse Fuel Engineering Co., 1125 Buchanan St., Rockford, Ill.— Combination gas-oil burner can be changed from one fuel to the other instantly and automatically by the flick of a switch. Fuels can be alternated according to availability, economy or suitability. Other burner features include dual atomization, making possible use of oil or gas with equal efficiency; built-in tuyere engineered to give the rotary combustion principle; simplicity of installation with all internal wiring and piping supplied; adjustable burner support, and electronic flame failure control, assuring positive safety with either fuel. Mixed, natural, or L-P gas or number 1, 2, or 3 fuel oil may be used with equal efficiency. Either type fuel can be burned without induced secondary air as the burner is designed to furnish its own air for complete combustion.

For More Details Circle No. 2—Page 347



3

(3)—Cleaning Cabinet: Hydro-Blast Corp., 2550 North Western Ave., Chicago—Cabinet for cleaning small castings utilizes a high pressure sand-water stream directed against the castings through nozzles. The cabinet may be equipped with a turntable or stationary table, and the nozzle guns may be fixed or movable, depending on the type of work. Various other means of handling the work are available. Usually core removal and finished blasting may be done in one operation.

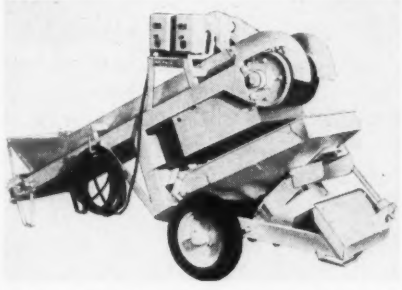
For More Details Circle No. 3—Page 347

(4)—Induction Furnace: Ajax Electrothermic Corp., Ajax Park, Trenton 5, N. J.—Mechanically operated induction furnace was developed for high-speed production of precision castings. At the end of the melting

period—12 minutes for 5 lb of alloy steel—the preheated mold or investment is clamped directly to the top of the crucible with a specially fitted mold holder. Operation of a control lever causes the furnace to rotate to pouring position and the molten metal fills the mold at the most desirable pouring rate. Induction furnaces are especially suited for melting the complex alloys common to high temperature and corrosion resistant applications. Temperature and analysis can be controlled within close limits. The electro magnetic stirring action common to induction furnaces promotes even distribution of elements throughout the melt. The new furnace is powered by a standard 20-kw mercury hydrogen type converter, and operates at a frequency of about 30,000 cycles.

For More Details Circle No. 4—Page 347

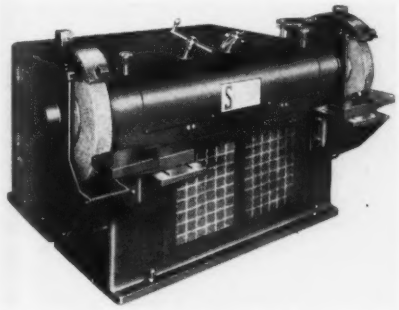
Sand Preparation: Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Portable sand conditioning machine provides magnetic separation and screening for small and medium size foundries. It is designed for shovel loading and is built in two sizes with capacities of 20 and 30 tons of magnetically separated, fully screened and aerated sand per hour. The well-balanced unit is equipped



with rubber-tired wheels and is said to be easily and quickly moved from foundry floor to floor.

For More Details Circle No. 5—Page 347

Twin Grinder: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4 — Twin motor, infinitely variable speed, snagging grinder of-



fers constant 9500 surface fpm throughout wheel life. Each individually powered wheel operates independently and has separate starting equipment, plus independent infinitely variable speed drive and safety interlock to prevent overspeeding of wheels. Speed change and simultaneous adjustment of wheel guard to the wear of each wheel is accomplished by turning a crank handle. The large area work rest is adjustable and supported by the base. Grinder is available in 20, 24, or 30-in. sizes powered by two 5 to two 60 hp motors.

For More Details Circle No. 6—Page 347

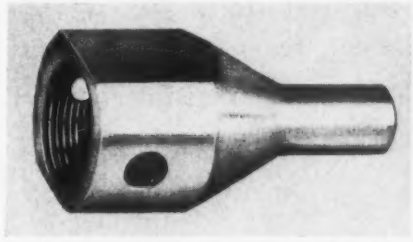
Belting: Imperial Belting Co., 1755 South Kilbourn Ave., Chicago 23—Acid-resistant conveyor belting has been developed for use in operations involving exposure to cutting oils and similar compounds with acid content. Belting is constructed of 37½-oz, tight woven silver duck, double stitched with innerlocking stitches to permanently prevent ply separation. Impregnation with special compounds is said to make the belt acid-resistant and produce a smooth, hard, low-friction surface that is ideal for deflection and slider bed service.

For More Details Circle No. 7—Page 347

Work Clothes: Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8—Work clothes made of Dynel fabric are said to resist acids, caustics, wear, moths, mildew, shrinkage, snagging, and tearing. Available in shirts, trousers, and coveralls, the clothes offer complete protection, yet are comfortable and neat appearing. They are easily cleaned and are unharmed by commercial dry cleaning and washing solvents, it is claimed. Chemical resistant qualities of Dynel are in the fabric itself, not added by a treating process.

For More Details Circle No. 8—Page 347

Cobalt-60: Tracerlab Inc., 130 High St., Boston 10—Nineteen cobalt-60 radiography sources, ranging in strength from 50 millicuries to 25 curies have been developed for nondestructive inspection of metal objects. Gamma rays emitted by Cobalt-60 have energies of 1.17 and 1.33 million electron volts, which correspond to the effective energy of 2 million volts of x-rays. These energies will permit examination of steel from ½ to 6 in. without excessive exposure times. Sources are only 10 mm wide by 21 mm long, allowing them to be placed inside complex castings; are made of ferromagnetic stainless steel; have a large threaded hole to accept a remote handling rod; a small hole to allow handling with string; and have flats machined on each side to prevent rolling. In addition to the sources, the company has developed accessory equipment, including source



container, magnetic remote handler, survey instruments and personnel safety equipment.

For More Details Circle No. 9—Page 347

Truck Loader: Efficient Equipment Inc., 1621 West Hastings St., Chicago 8—Loader, adjustable to any size dump truck, consists of an at-

tachable shovel or magnet, lifting arms and hydraulic equipment. Trucks equipped with the unit are self-loading and also can be used as light cranes for lifting materials into other trucks, bins and low gondola freight cars. The loader is mounted on the rear of the truck body and is operated by controls on top of the truck cab or from auxiliary controls on the truck side. Lifting arms may be equipped with a 1-cu-yd shovel or bucket, a magnet, or chains. Lifting capacity of the arms is about 4400 lb. Hydraulic system is operated from the truck power takeoff. An auxiliary generator must be installed for magnet operation.

For More Details Circle No. 10—Page 347

Cupola Hot Blast: Todd Shipyards Corp., Combustion Equipment Division, 81-16 45th Ave., Elmhurst, Queens, N. Y.—Hot-blast heater has been designed specifically for iron melting cupolas. Heater is said to heat pure uncontaminated air, of any foundry required volume, up to 1000° F in a few minutes at small operational cost and with practically no maintenance. It is a single package unit, comprising an all-metal combustion chamber, tubular heat exchanger, and their auxiliaries and accessories, mounted on a single base. The control panel may be remotely located,

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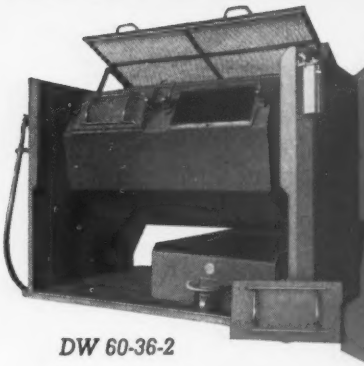

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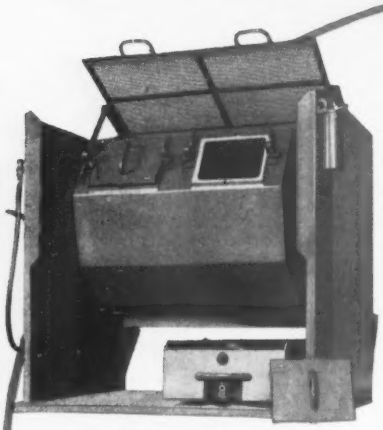

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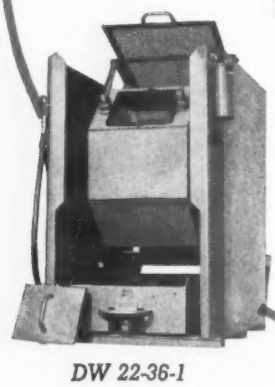

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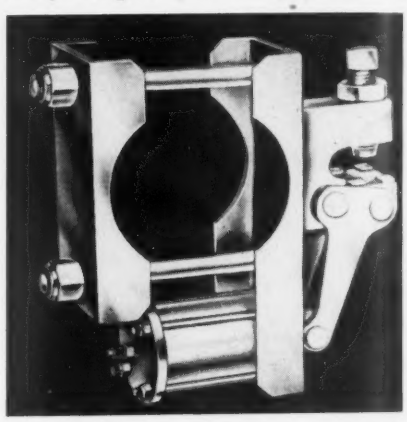
ORIGINATORS OF THE ROTO-FINISH PROCESS

and the unit may be manually or automatically controlled. The combustion chamber may be fired with oil, gas, or a combination of both, and automatic controls keep the process air of the hot blast within ±5°F of the chosen range regardless of the volumetric load changes in the blast required by the cupola operator. Air delivered to the cupola does not contain the products of combustion.

For More Details Circle No. 11—Page 347

Vibrator Clamp: Viber Co., 726 South Flower St., Burbank, Calif.—Air-operated mounting clamp is designed to speed up attachment of external vibrators to loaded cars or trucks. No lengthy installation is said to be necessary as air pressure applied first to the clamp causes specially designed jaws to grip suitable



steel members such as an exposed angle. This is said to require only a few seconds and air can be applied to the vibrator immediately for whatever period vibration is necessary.

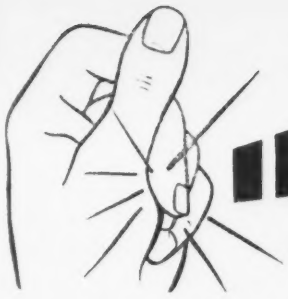
For More Details Circle No. 12—Page 347

Melting Furnace: Reda Pump Co., Bartlesville, Okla.—The company's furnaces for melting ferrous and nonferrous metals now incorporate these new features: Swinging stack cover for ease of charging; one-piece stack front and one-piece roof, giving easy access to the hearth for maintenance; positive tilting device of the mechanical type, electrically powered but equipped for manual tilting in event of power failure. The furnaces are available in size ranges from 400 to 2000 series.

For More Details Circle No. 13—Page 347

Refractory Brick: North American Refractories Co., 1012 National City—East Sixth Bldg., Cleveland 14—Clay-graphite refractory brick is a prefired product and is claimed to have the ability to shed slag, preventing rapid deterioration of the refractory. Successful installations include most ladles, blast furnace splasher plates, blast furnace runners, pig ma-

(*Continued on page* 349)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

50. Give This a Tumble

American Wheelabrator & Equipment Corp. — You won't call your batches of castings, forgings, stampings, heat treated parts, etc., other names when you see how well the Wheelabrator Tumblast machine blast cleans and finishes them. Get the how's, why's and other data in 16-page illustrated catalog No. 254-A. Actually *see* what *this* can do for *you*.

51. For Smooth Cuts, But Fast

Linde Air Products Co.—Get the Oxweld C-32 cutting blowpipe with the floating mixer for smooth, fast cuts says 4-page illustrated bulletin P-21950. How it operates, where it is used, types of nozzles and other valuable info are yours for checking this number.

52. Give Dust a Whirl

Peters-Dalton Inc.—16-page illustrated technical bulletin No. 101 gives you all the dope on the Hydro-Whirl method of wet dust control. It gives you the styles available, applications, advantages, sizes and much pertinent data. With it, there is no need to tell employees or neighbors "excuse our dust."

53. For Better Results—

Atlantic Chemicals & Metals Co.—You can treat yourself to better results when casting and when smelting or refining by using Immunitas products described in this 12-page folder. Also get the dope on Zincorex DT for die casting and other products for cleaner metals and sounder castings.

54. Savings a la Hopper

Roura Iron Works, Inc.—You can save 50 per cent of your labor time with Roura self-dumping hoppers, according to 4-page illustrated bulletin PM100. Made in various capacities, stackable and versatile, hoppers reduce fatigue and step up production. Hop to it! Get this bulletin!

55. Recover Those Rejects

Tincher Products Co.—If you have rejected castings and have diagnosed the trouble as porosity, then the Tincher Process can be the cure. Fifty-nine (59) questions on the process are answered in this spiral-bound illustrated brochure. If your casting must withstand liquid or gas pressure, latch onto this booklet—it has all the answers.

56. You've Been Flasking for It

V-G Flask & Fitting Co.—Your foundry operations will become more fruitful if you use Cherry Snap Flasks, described in 4-page illustrated price list No. 52. All pertinent data is included. Also a sheet on V-G wide V-pin assembly. Get this!

57. A Bully of a Tool

Wilkinson Equipment & Supply Corp.—A thousand different cutting, chiseling and routing jobs can be performed by the Bantam Bully air hammer capable of delivering 13,000 blows per minute. 4-page bulletin describes this tool and relates its use in electric motor and auto repair shops, factories and foundries.

58. Safety Clothing

B. F. McDonald Co.—Everything in line of safety clothing from suits to gloves is pictured and described in 20-page catalog No. 50. Contents cover safety hoods, suits, jackets and pants, aprons, capes and sleeves, gloves, hand and knee pads, leggings, toe guards, boots and insoles. Play it safe!

59. Cupola Efficiency

Foxboro Co.—Hundreds of foundries are profiting by using the Foxboro Air Weight Controller described in 14-page illustrated bulletin 268-3. By supplying the proper weight of air, uniform melts are assured. You can get top efficiency, too.

60. Air Compression, Etc.

Schramm Inc. — That invisible, odorless combination of gases—air—is the subject of three highly interesting brochures. No. C-50 B "Stationary Air Compressors, Their Sale and Installation" is illustrated and has 32 pages. Much basic data can be found in the 8 pages of No. C-52-B "Fundamentals of Air Compression." And in 8-page No. C-53-B, you'll read about "Electricity as used for Schramm Air Compressors."

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

FOUNDRY 5-52
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61. Foundry Equipment

Sterling Wheelbarrow Co.—Don't let the name of this company fool you—it is offering a broad line of foundry equipment, including flasks of many types, flask accessories, pins, bushings, core plates, buggies, wheels, wheelbarrows (yes), carts and trucks. Get 52-page illustrated catalog 64.

62. Thermocouples & Accessories

General Electric Co.—Step right up and get this 24-karat catalog GEC-714 on thermocouples, components and accessories for your pyrometer installation. It has 20 pages with illustrations, tables and data compiled to help you. Ordering examples included will assist you.

63. Sand Ramming Equipment

Pettibone Mulliken Corp., Beardsley & Piper Div.—We're not slinging it when we say that 36-page technical bulletin No. 310 gives you a-l-l the dope on the stationary Sandslinger and Speedslinger sand ramming equipment. Features, specifications, photographs and engineering drawings are there.

64. Get to the Core of Things

United Oil Mfg. Co.—In the six technical bulletins (Nos. 1, 2, 15, 16, 19 and 38) contained in multipage catalog "Aqua-Set Core Binders" you come in contact with a wealth of info on these binders. Directions for using, user findings and tables are included.

65. Melting & Refining Furnaces

Hey! Don't pass this one up. Here is a 62-page well-illustrated catalog out from which you will get extra. It describes in infinite detail Moore Rapid Lectromelt Furnaces for melting and refining of iron, steel, nickel and copper, so get it quick. Offered by Pittsburgh Lectromelt Furnace Corp.

66. Let's Not Be Obnoxious

American Wheelabrator & Equipment Corp.—The good neighbor policy applies to industrial plants too. Dust and fume control is essential to good housekeeping in plants, minimum maintenance, and health and happiness of your workmen. To find out how obnoxious or dangerous dust and fumes can be controlled, get a copy of catalog 72-B. It contains 36 pages of practical data on Dustube units.

67. Shake 'Em Loose

Cleveland Vibrator Co.—"Bin Stuck Lately?" is title of 4-page bulletin 108 that shows how air-cushioned pneumatic vibrators will move, settle or package bulk materials. Complete data on various sizes of vibrators, valves and fittings are included in catalog 105. Copies are yours for the asking.

68. Castings Porous?

American Metaseal of Detroit, Inc.—You'll have more coppers jingling in your jeans if you can take advantage of the info in this 4-page folder. It has a description of impregnation process for eliminating porosity or leakage in castings; a description of pressure bonding process to eliminate nut and bolt and screw and thread assemblies and soldering or welding, and general information on Metaseal 19V5 impregnating material.

69. Steel Flasks

Shanafelt Mfg. Co.—Need any flasks? Not the hip pocket models, but the steel foundry type. Then, send for 18-page bulletin F-10 which illustrates a wide range of styles and sizes of steel flasks and accessories. Accessories include bottom plate, pin lugs, trunnions, flask clamps and lugs, bars and bar lugs, pins and bushings.

70. Hot Stuff

For a complete line of melting and holding equipment, open up a copy of 12-page bulletin No. 551. There you'll find a size and type of Lindberg-Fisher furnace for every need. They're made by Lindberg Engineering Co. You need this booklet if you melt metal.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

71. Centrifugal Casting

If you've been going round and round lately, maybe information on "Some Recent Developments in Centrifugal Casting" is what you need to straighten you out. Illustrated 12-page FOUNDRY reprint consists of two articles, the first of which concerns employment of metal molds, while the second deals with dual-metal castings in which dissimilar metals are cast within centrifugal mold.

72. Casting Valve Seat Inserts

Sit up and take notice if you want to know about "Casting 100,000 Valve Seat Inserts Daily." Bob Herrmann, FOUNDRY Associate Editor, reports in an 8-page illustrated reprint how Engineering Castings Inc., Marshall, Mich., reached this remarkable production figure in a little over 5 years of operation.

73. Foundry Efficiency

Want to double your foundry production? Maybe you can come close by reading FOUNDRY reprint entitled "Efficient Operation Doubles Foundry Production." It reports how one Canadian outfit designed to produce 35 tons of castings in an 8-hour day boosted its average output to 165 tons in two 9-hour shifts.

74. Doubles Foundry Output

Studebaker Corp.—You'll have no doubt as to whether Studebaker is coming or going after reading this highly illustrated 32-page reprint "Studebaker Doubles Foundry Capacity." A series of three informative articles, report tells how company modernized its gray iron foundry and doubled productive capacity without suspending operations.

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5-52

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(*Continued from page* 346)

chine runners, electric furnace runners, cupola spouts, cupola forehearths, etc. Brick are available in 9-in. straights and most standard 9-in. series brick. Special shapes can be produced on request.

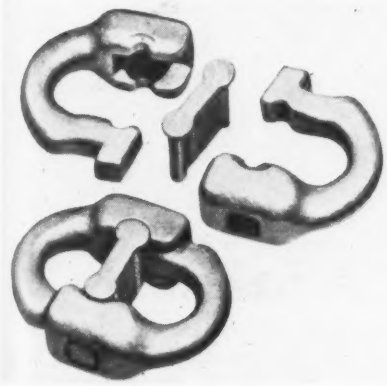
For More Details Circle No. 14—Page 347

Tractor-Shovel: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill. —Four-wheel drive tractor-shovel has a 1-cu-yd bucket with 60-hp diesel or 54-hp gasoline power optional. Unit

is equipped with large pneumatic tires, same size all around, and has four speeds in both directions. Rear wheel steering with power booster plus short wheel base makes the machine easy to operate and highly maneuverable, it is claimed. Fingertip controlled hydraulic power raises and lowers and dumps and closes the bucket. Automatic quick tip back of the bucket is provided so that heaped bucket loads can be retained without spilling and can be carried low for good machine balance and full operator visibility. Bulldozer blade, crane hook, fork lift and snow plow attachments are available, quickly interchangeable with the bucket.

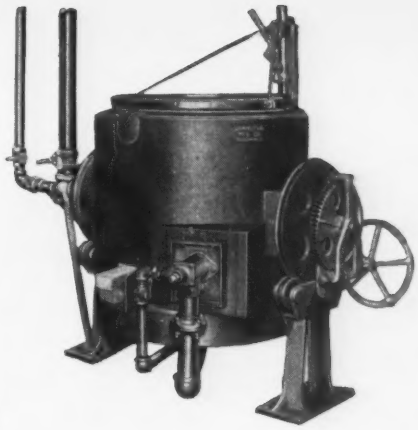
For More Details Circle No. 15—Page 347

Chain Connectors: Interstate Drop Forge Co., Products Division, 4001 North 27th St., Milwaukee 9— Connecting links for carbon and alloy chain are said to be stronger than alloy steel chain of comparable size.



Two sizes of links will connect any size chain from ¼ to ¾-in., depending upon type of chain used. Other sizes, up to 3 in., are available. To make a connection, half of the link is

"It's the Hottest Melting Furnace we know of!"



"We're extremely well pleased with our Johnston Brass Melting Furnace. Our *average* melting time for a 1,000 pound heat in this gas fired furnace is one hour. It's clean and it's really *FAST!* We like it so well that we have installed a Johnston Burner and Blower on a competitor's furnace we have here. The new Burner and Blower have cut our melting time almost in half for this furnace!"

Frank Ryan, V. P., St. Paul Brass Foundry
451 E. Sixth St., St. Paul, Minn.

JOHNSTON BRASS MELTING FURNACES
Tilting Crucible Type • Oil or Gas Fired
for Melting All Brasses, Bronze, Copper & Aluminum

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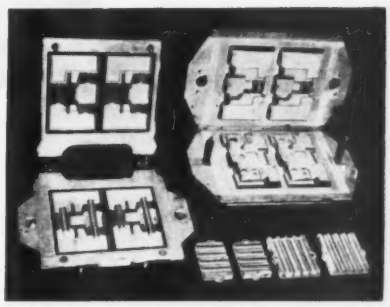

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Fully machined magnesium book type green sand core box and fully machined aluminum cope and drag plates for accurate, economical production of tractor shoes in a modern foundry.

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slipped into each of the two sections being connected. Link halves are assembled and the spacer driven between the links. Projecting points on the spacer then are peened.

For More Details Circle No. 16—Page 347

Fire Extinguisher: Walter Kidde & Co., 675 Main St., Bellville 9, N. J. —Pressure-operated, dry chemical, portable fire extinguisher may be serviced, following discharge, by pouring 5 lb of dry chemical into the powder chamber and, with a gas station or factory air line, charging the unit with 150 lb of compressed air. Nozzle discharges a cloud-like pattern which is the most effective for extinguishing flammable liquid and electrical fires. With a range of 5 to 7 ft, the cloud pattern also eliminates the possibility of splashing burning substances as a result of too forceful a discharge stream. Extinguisher features a trigger-type finger control, and a gage built into the handle to show pressure in the unit.

For More Details Circle No. 17—Page 347

Level Indicator: Bin-Dicator Co., 13946-107 Kercheval, Detroit 15—Bin level indicator is designed for suspended installation from above and can be located anywhere in the bin where there will be a free flow of material to and away from the diaphragm. Unit is said to be successful in bins containing materials which build up on the walls and flow down through the central area only. Indicator may be drilled and tapped to take any size pipe up to 2 in.; the support pipe also accommodates electrical wiring. Because of the manner of mounting, the installation can be moved up or down in the bin to operate at different levels or lifted out for inspection.

For More Details Circle No. 18—Page 347

Welding Rods: Metal & Thermit Corp., 100 East 42nd St., New York 17—Hard-facing electrodes and acetylene welding rods were developed for hard-facing applications requiring extreme abrasion, medium and heavy impact, severe shock, high red hardness, and extreme heat and corrosion resistance. In addition, a new tungsten-carbide rod provides an exceptionally slag-free deposit, allowing all residue to be cleaned away by wire brushing.

For More Details Circle No. 19—Page 347

Wax Lubricant: Industrial Products Dept., S. C. Johnson & Son Inc., Racine, Wis.—Blend of special solid waxes in stick form is said to provide a durable, clean lubrication for metal sanding, metal sawing, pipe cutting and threading, drilling, tapping, grinding and flush riveting. Use of the wax is said to extend the life of tools as well as sanding and grinding surfaces. It also provides a better finish on the worked pieces; burrs are eliminated when metal is cut or drilled and a smoother finish is achieved when grinding or sanding metal surfaces. Wax sticks are 2 in. in diam and weigh 1 lb.

For More Details Circle No. 20—Page 347

Floor Reinforcement: Acme Steel Co., 2840 Archer Ave., Chicago 8—An 11¾-in. square plate of 0.068-in. hot rolled steel has been designed for reinforcement and protection of concrete floors subjected to heavy loads and severe punishment. It can be installed as a new floor surface or over old floors. Each plate contains 100 small rectangular holes approximately ½ x ¾-in. and 100 barbed prongs to anchor the plate to the concrete. Edges of each plate form a flange that becomes imbedded in the concrete and adds rigidity to the plate. The surface of a concrete floor reinforced with these plates is 74 per cent steel and 26 per cent concrete.

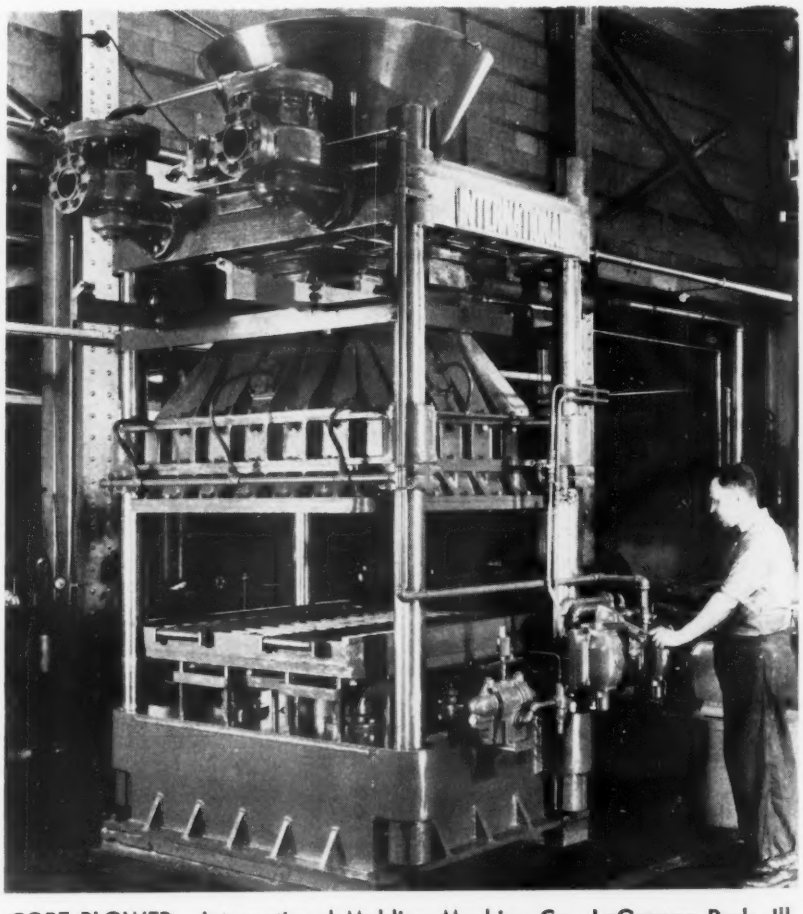
For More Details Circle No. 21—Page 347

Gloves: Edmont Mfg. Co., Coshocton, O.—Plastic coating on gloves is said to provide lasting flexibility and improved gripping qualities. The liquid-proof coating is bonded to the fabric lining and is claimed not to crack or peel. Coating is resistant to abrasion, oil, grease, acids and other chemicals. Gloves are supplied in knit-wrist, band top, and gauntlet styles, coated overall or palm and thumb.

For More Details Circle No. 22—Page 347

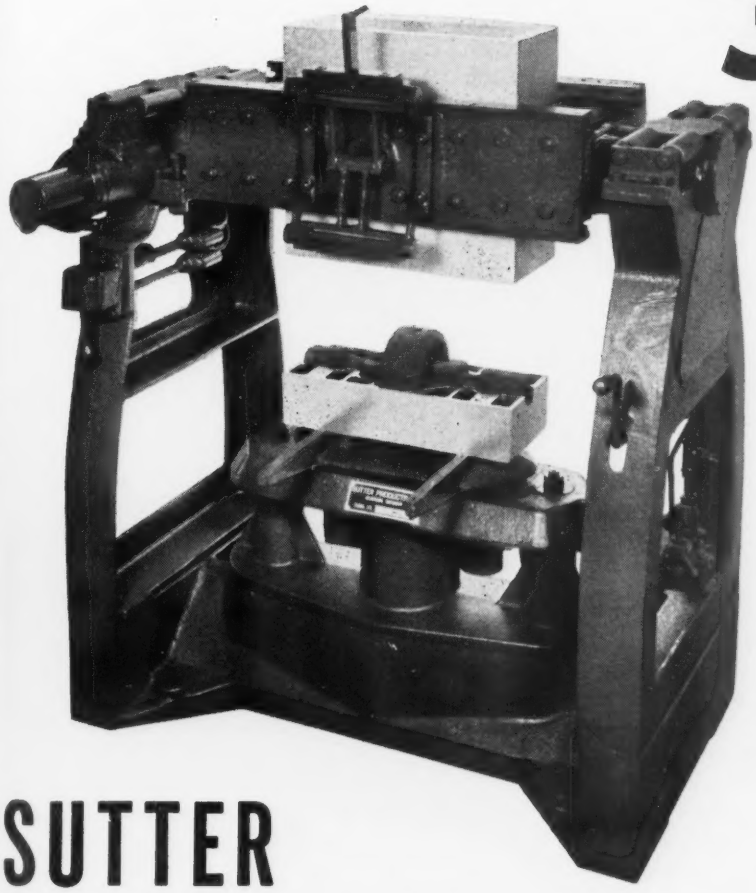
Concrete Cutting: Clipper Mfg. Co., 2800 Warwick, Kansas City 8, Mo.—Concrete cutting diamond blades have been added to company's line of blades for cutting hard vitreous materials on masonry saws. New

(*Continued on page* 352)



CORE BLOWER: International Molding Machine Co., LaGrange Park, Ill., has built what is claimed to be the world's largest sand blower. It is in operation, making cores for jet engine parts, at the Ford Motor Co. Aircraft Engine Division plant, Chicago. Machine weighs 31,500 lb, is 11½ ft high, covers a 6 x 6-ft floor area, has a 58-in. square blow plate and a 22-in. diam sand container throat opening. It can handle up to 2 tons of sand and will blow cores weighing as much as 1500 lb

See how you can boost Core Output 300%



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After clamping the dryer, push the start button and six seconds later a drawn core rests on the draw table . . . it's that simple with the Sutter Core Draw Machine. This rapid, completely automatic cycle speeds up production from 300% to 400% and also frees the operator to blow another core while one is being drawn. Further, because every core is drawn uniformly, even unskilled operators can maintain peak production of the most complicated cores with minimum rejects.

The Sutter Automatic Core Draw Machine will be operating at the Foundry Show in Booth 1350. Be sure to look in and find out how it can boost production and cut core costs in *your* plant. If you can't get to the show, send for Bulletin "F" which gives the whole story.

See SUTTER SHELL MOLDING MACHINE in operation at Booth 1839

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Seven sizes available.

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⅜" SA	$ 7.60	_____
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⅞" SA	10.45	_____
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The type SA is part of the well-known, carefully engineered Cleveland line of quality air vibration equipment.

THE CLEVELAND VIBRATOR COMPANY

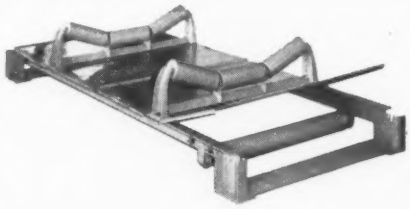
2789 Clinton Ave. · Cleveland 13, Ohio

(*Continued from page* 350)

blade is said to cut concrete, containing limestone aggregate, up to 10 in. per minute when cutting at a depth of 1 in. Asphalt, containing the same aggregate, and cut to the same depth, can be sliced at the rate of 12 in. per minute. Blades are manufactured in diameters from 8 to 18 in. and in thicknesses of 5/32 to 7/64 in. for use on any type concrete saw.

For More Details Circle No. 23—Page 347

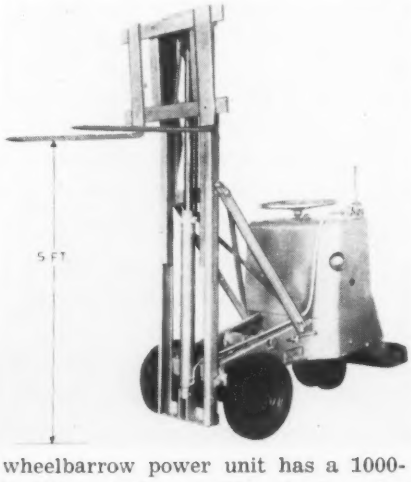
Belt Conveyors: Transall Inc., 109 North Eleventh St., Birmingham 4—Sectional belt conveyors, featuring flexibility of design, have sections



which are chair supported for easy mounting on floors, ramps or cross ties. Low-cost anchored foundations also are available for long-distance installations. Sections are hinged at the mounting point to allow conveyor to conform to rolling or uneven terrain. All parts are interchangeable, nest or stack compactly, and are handled easily by one man, it is claimed. Assembly or disassembly is simple, and the open top construction (when troughing idlers and deck plates are removed) simplifies installation of the return belt. All sections are equipped with heavy duty prelubricated idlers. Terminal equipment is engineered to meet job requirements.

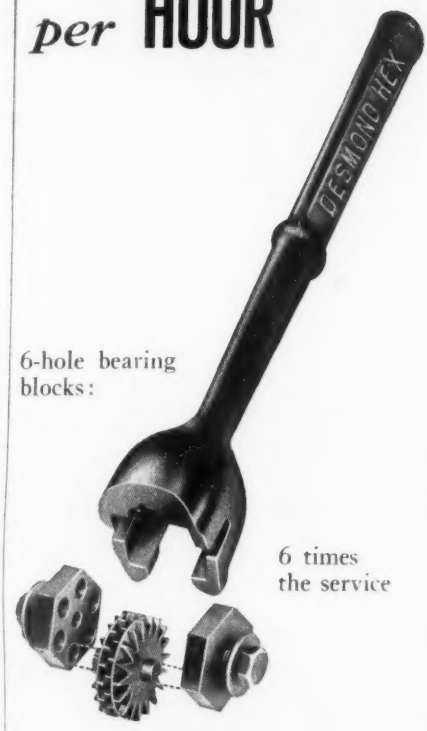
For More Details Circle No. 24—Page 347

Fork Lift: Kwik-Mix Co., Port Washington, Wis—Power-driven fork lift attachment for the company's



wheelbarrow power unit has a 1000-lb lift capacity at 15-in. load center and will raise the load a maximum

MORE GRINDING *per* HOUR



6-hole bearing blocks:

6 times the service

MORE GRINDING *per* WHEEL

You'll speed up grinding production—get more work per hour *and* per wheel—when you dress wheels periodically with the right Desmond dresser for the job. Only Desmond makes the famous Hex Dresser, (illustrated) using Huntington-type cutters mounted in 6-hole bearing blocks which give six times the service.

The Desmond Dresser Guide—a 9" x 12" wall chart—shows the main types of dressers and when to use them, helps maintain top grinding production. Contact your Desmond distributor for free copies of the **Guide** and for all your dresser and cutter requirements . . .

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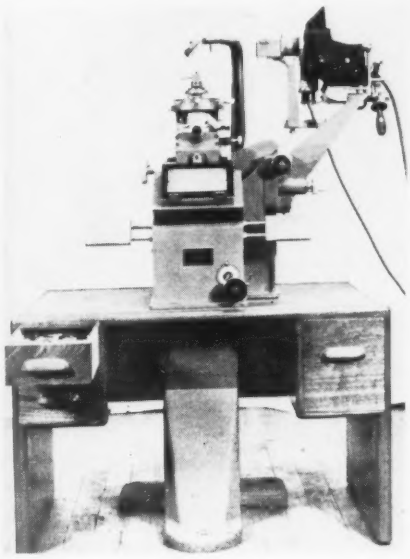
Desmond
DRESSERS & CUTTERS

of 5 ft. Lift unit operates from a power-driven hydraulic pump. Power unit is equipped with a 6-hp gasoline engine; power is transmitted by V-belt and roller chain through an automotive type differential in the front axle for two-wheel drive. With 75 per cent of loaded weight on front drive tires, good traction is provided. Machine can climb a 12 per cent grade with forks fully loaded, has a 33-in. width and turning radius of 61 in. Standard forks are 20 in. long and adjust to any width up to maximum of 33 in.

For More Details Circle No. 25—Page 347

Metallograph: R. Y. Ferner Co., 176 West Adams St., Chicago 3—Vertical type metallograph for examination of metallurgical specimens is a projection microscope having the full range of bright field, dark field,

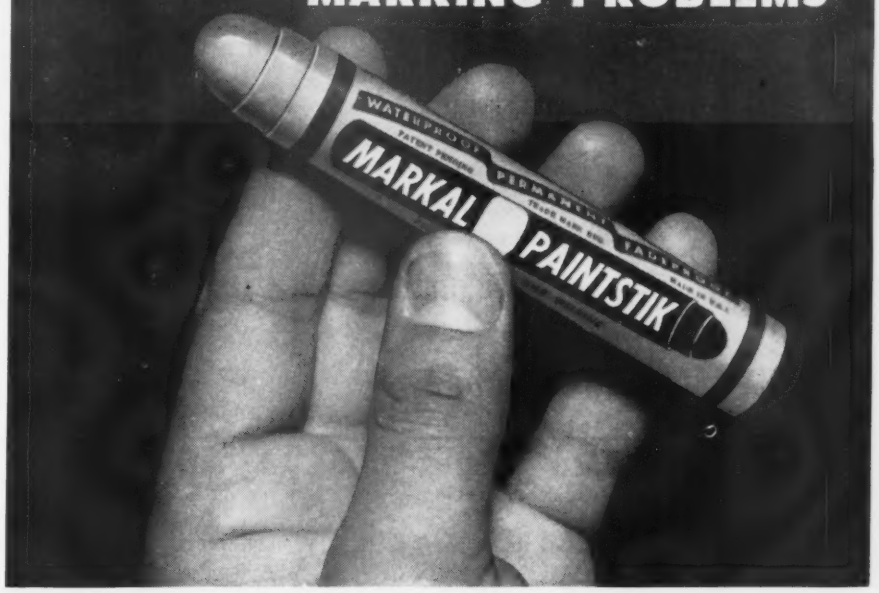


polarized light, macro examination, phase contrast, and micro hardness testing. It is said to be easily set up for critical work and to produce photomicrographs of good resolution and flatness of field in both low and high power work. Focusing adjustments are precise for both macro and micro work. Three light sources—carbon arc, tungsten arc point source, and a mercury vapor lamp—are supplied in a choice of two. Each source may be centered exactly

For More Details Circle No. 26—Page 347

Grinders: Mall Tool Co., 7725 South Chicago Ave., Chicago 19—Small pneumatic grinder weighs 18 oz and is 5¼-in. long overall. It features an exhaust that directs air away from the operator toward the wheel to cool and clean the work; chuck guard, and noise silencer. Grinder can be used with such accessories as mandril-mounted abrasive wheels and points, rotary files, carbide burrs, wire brushes, cart-

THE SOLUTION TO YOUR MARKING PROBLEMS



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Steel ingots, welding, heat treated metal.

COLD SURFACES—as low as—50° F.
Any surface, wet or dry, icy, rough or slick.

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The wide variety of Markal Paintstiks makes it possible to correctly mark your products knowing that the mark will be permanent or can be removed when you want it. Temperatures, hot or cold, are no problem as there is a Paintstik for all conditions. Hot castings for example can be marked and immediately immersed in cold water bath without defacing the markings. Paintstiks provide a mark that remains highly legible, adheres to the surface and will not run, char, flow, discolor, peel or crack. Specify Markal Paintstik the next time you order.

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Here are a few of the many uses

- √ Marking hot castings
- √ Marking billets (cold)
- √ Marking cold plates for identification
- √ Marking parts to withstand range of annealing temperatures
- √ Marking steel ingots at 1600°F
- √ Marking hot metal slabs
- √ Marking guide lines for torch cutting and welding
- √ Marking metal parts
- √ Marking in color for identification and coding

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	"MOLDUKO"* CORE & MOLD WASH Produces smooth castings—Stops "burning in"—Airdries Will ship **10 Gals. of Molduko & 25 lbs. of Filler** at full drum prices for test purposes.
	HYDRO GRAPHITE *(It's New!)* Excellent permanent mold wash.
	"CARBON-RAISER"* (Add to the metal in the ladle, at the spout, in the furnace or in the cold charge) **IRON FOUNDRIES** use to control depth of chill and improve the machineability of the castings. **STEEL FOUNDRIES** use to control carbon content, in the ladle and in the furnace quickly, accurately and efficiently.
	PARTING (DRY or LIQUID) Non Silica or Tripoli, Highest Quality
	PIPE REDUCER Used on "Gates" and "Risers" in Steel & Iron foundries.
	PLUMBAGO & CORE WASHES In both Dry and Paste forms.
	LADLE WASH
	MUDDING COMPOUNDS
	CORE PASTES Strong bond, Dry quickly.

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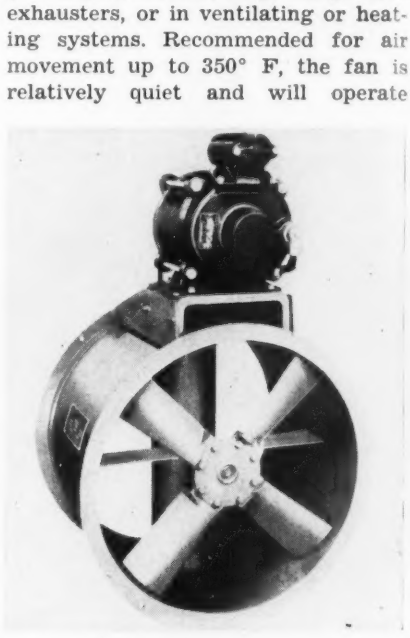
ridge-wound coated abrasive rolls, sanding and polishing disks, and shaping and finishing attachments for dies, molds, castings, forgings and patterns. Another pneumatic grinder, weighing 1¾-lb, is designed for rotary filing on aluminum and magnesium castings, or any fast, large-scale grinding job.

For More Details Circle No. 27—Page 347

Fan: Chelsea Fan & Blower Co., 639 South Ave., Plainfield, N. J.—Belt-driven fan, with motor outside of air stream, is designed for use in paint spray booths, large range hood exhausters, or in ventilating or heating systems. Recommended for air movement up to 350° F, the fan is relatively quiet and will operate



against moderate static pressure up to 2 in. It has cast aluminum airfoil type propellers, ball-bearing mounted, and motor is semienclosed or explosion proof, as required. Hoods can be supplied for outside mounting. Units are available in sizes from 16 to 36 in. with air deliveries from 2700 to 23,000 cfm.

For More Details Circle No. 28—Page 347

Oil Heater Cleaner: Magnus Chemical Co., South Ave., Garwood, N. J.—Cleaner has been developed for removing carbonaceous deposits from the tubes of fuel oil heaters without need for dismantling the equipment. The liquid cleaning compound is mixed with two parts of water and pumped through the exchanger to remove the carbon deposit. After the cleaning operation, the exchanger is flushed with water, and a completely clean system is said to be obtained.

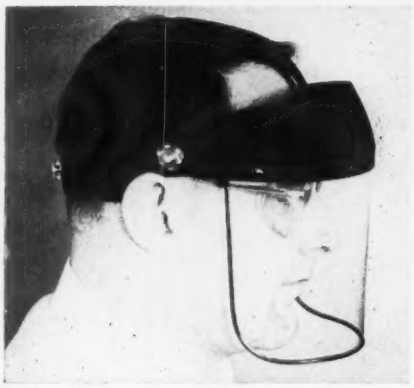
For More Details Circle No. 29—Page 347

Glazing Compound: Monroe Co., 10703 Quebec Ave., Cleveland—New glazing compound for sealing windows against moisture and dirt is said to harden only on the surface.

remaining soft and pliable underneath to cushion glass against high winds or vibrations from machinery. It adheres to glass, metal or wood surfaces and forms a permanent seal against moisture from rain, steam, or frost, thus preventing rotting or rusting of window sash. It also prevents dust, dirt, and drafts from entering around window lights. Its pliability permits it to contract and expand with temperature changes and vibrations. It is applied with an ordinary glazing tool or wide blade spatula and can be painted over within 48 hr after application.

For More Details Circle No. 30—Page 347

Face Shield: Boyer-Campbell Co., Safety Division, 6540 St. Antoine St., Detroit 2—Face shield is designed with sufficient clearance to be worn over glasses with ultra-modernistic frames and industrial goggles. Shield



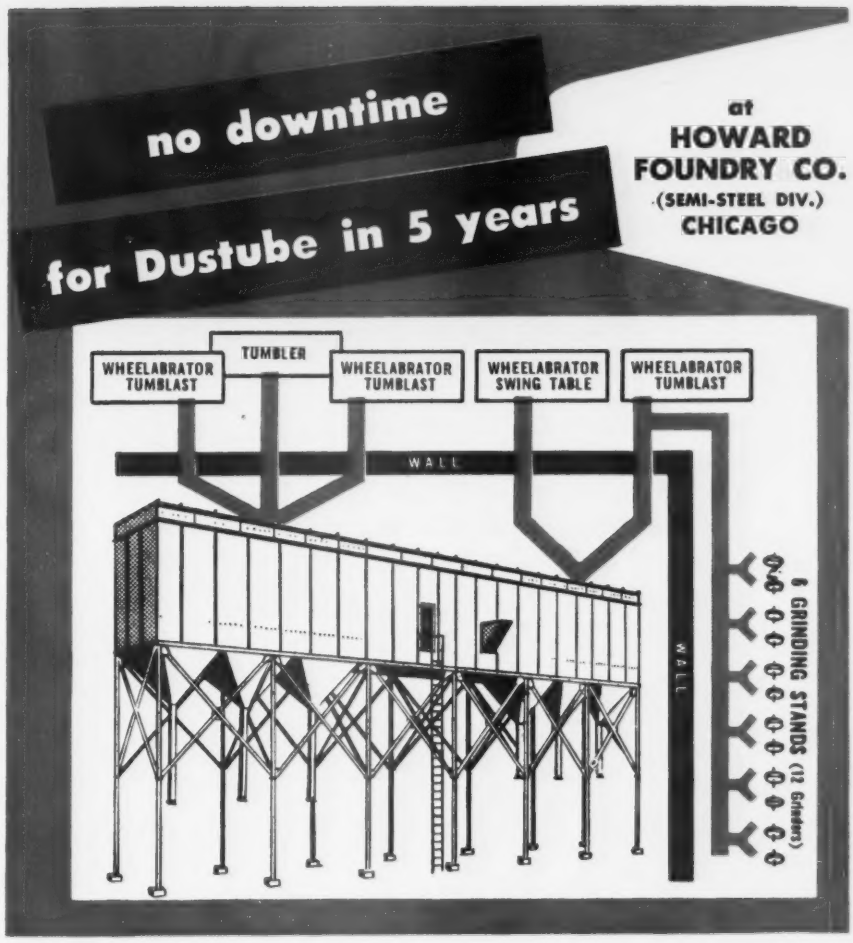
is snap-fastened to a form-fitting head gear, adjustable to any shape or head size. The greater clearance for glasses or industrial goggles also aids ventilation. Three types of shields are interchangeable on one head gear: Plastic shield for general utility; fibre front with glass holder for gas welding, and screen window for scaling, heat, cyaniding, etc.

For More Details Circle No. 31—Page 347

Metal Blackening: Swift Industrial Chemical Co., Canton, Conn.—New, two-bath method for blackening ferrous alloys, malleable and cast irons, and carbon steels is reported to be effective over a wide temperature range creating a black surface of uniform density without causing dimensional change in the blackened piece.

For More Details Circle No. 32—Page 347

Flooring Material: Flexrock Co., 3699 Cuthbert St., Philadelphia 4—Patching and resurfacing material for concrete, brick, or stone floors requires no heat or special skill in application. Surfaces are said to be ready for traffic in 18 hr. As a patching material it produces feather



A Dustube Collector at Howard Foundry Company, Semi-Steel Division, Chicago ventilates six grinding stands and five pieces of casting cleaning equipment. In the five years that this Dustube has been installed, not a single cloth tube or any of the working parts has been replaced. And the Dustube is efficient, too. Dust counts have shown that all harmful dust is exhausted from the cleaning room.

You can save yourself a lot of headaches and a lot of money too, by installing a Dustube. Its 9 profit-saving features add up to high efficiency and low cost operation. *Write for complete details.*

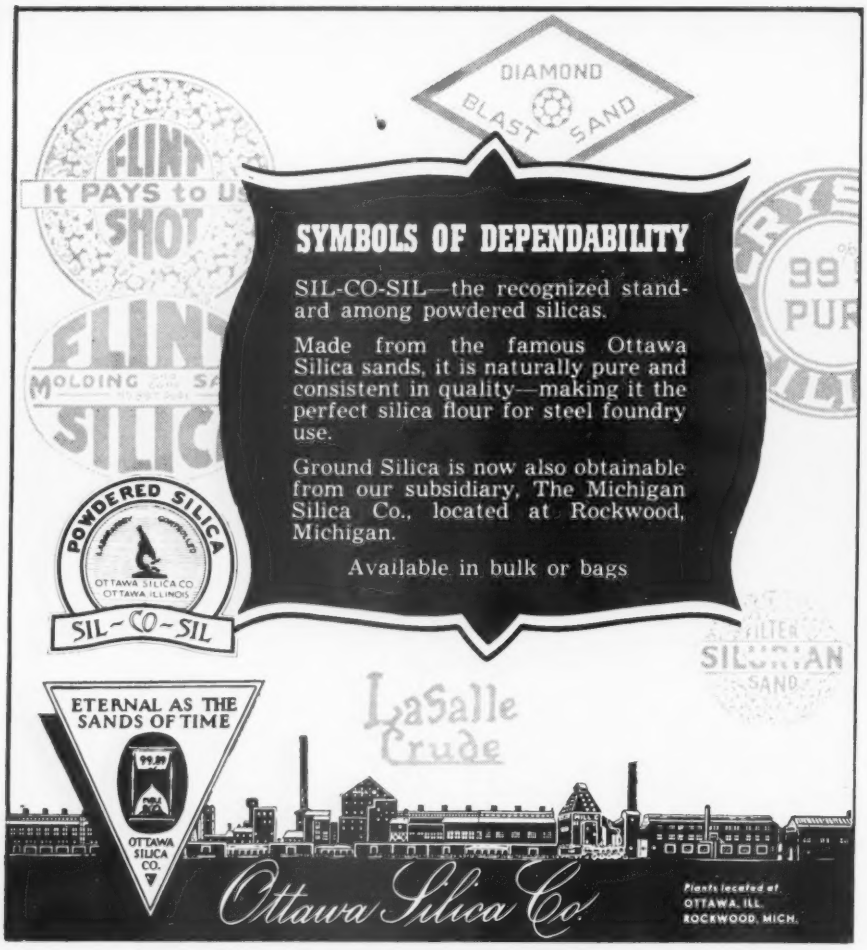
Mr. A. E. PORTER, Manager of the Semi-Steel Division, says:

"Foundry dust is not only expensive but also troublesome. We are extremely happy that this is completely eliminated in our finishing department with the Dustube Collectors and at an exceptionally low operating and maintenance cost. In terms of efficiency and cost saving performance, our Dustubes are the best investment we have ever made."

American dustube® DUST COLLECTORS

OFFICES IN PRINCIPAL CITIES

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka 2, Ind.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SIL-CO-SIL—the recognized standard among powdered silicas.
Made from the famous Ottawa Silica sands, it is naturally pure and consistent in quality—making it the perfect silica flour for steel foundry use.
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W. G. REICHERT ENGINEERING CO.
1060 BROAD ST., NEWARK 2, N.J.

edge repairs without chopping out the old floor. Features claimed are that it aids in leveling linoleum and tile; helps set floor plates and drains; protects from water, moisture, vibration; trowels in easily around machine bases, pipes, and other obstructions; and shows no shrinkage cracks.

For More Details Circle No. 33—Page 347

Hoists: Harrington Co., Seventeenth & Callowhill Sts., Philadelphia 30—Trolley hoists are adjustable for a range of I-beam sizes without dismantling. High-carbon, hardened steel trolley wheels feature large-diameter, double-row ball bearings lubricated through the stud by a pressure grease

gun. Hoists are of all-steel construction; gears and shafts are mounted on lubricated-for-life, shielded ball bearings; gears are precision cut from heat treated alloy steel, and load chain is of heat treated high-carbon steel. Capacities are ½, 1, and 2 tons.

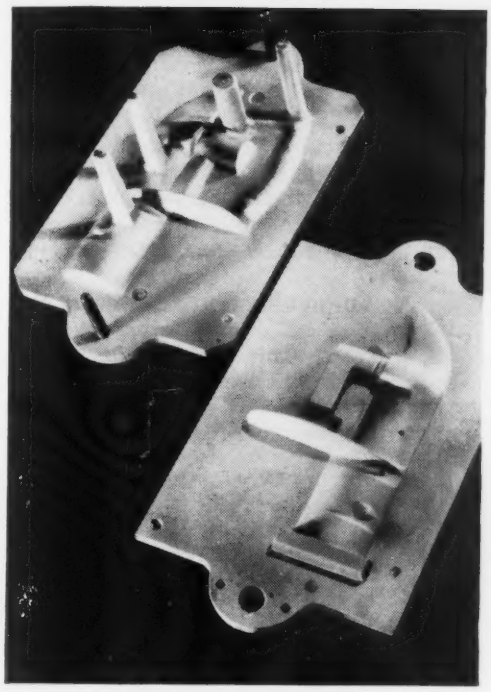
For More Details Circle No. 34—Page 347

Grinding Wheel Mount: Chicago Wheel & Mfg. Co., Dept. F, 1101 West Monroe St., Chicago 7—New mounting for portable tool wheels and tool and cutter wheels is designed to dampen vibrations and give better finishes, eliminating the necessity of changing the wheel to obtain a smoother finish. The new mount may be used on all types of portable tools and tool and cutter grinders, as well as bench grinders.

For More Details Circle No. 35—Page 347

Jointer: Heston & Anderson Division, St. Paul Foundry & Mfg. Co., Fairfield, Iowa—New 6-in. jointer has a narrow throat opening and a fence that may be set at an angle across the cutterhead for shearing cutting and for jointing short stock safely.

(*Continued on page* 358)



Foundries and Pattern Shops may now order Cast Aluminum Pattern Plate from stock! This new product, Alcoa Tool and Jig Plate, offers impressive savings:*

► A plate that is moderately priced (about $4.00/square foot)

► Excellent for cope and drag plates, core blower plates and match plates...cut to any dimension

► Available in 11 different thicknesses from 1/2" to 4" ...maximum size 48" x 96"

► A cast plate strain relieved, machined both sides. Thickness is held within ±.010"

* *For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office . . . or Aluminum Company of America, 1949-E Gulf Bldg., Pittsburgh, Pa.*

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REGULAR LOOSE MOLDING METHOD		SUPER TAMASTONE MACHINE MOLDING METHOD	
Loose molding labor $2.00 per hour 8 hours	$ 16.00	Machine molding labor $1.80 per hour 8 hours	$ 14.40
Casting weight, 5 pounds each 25 molds per day—125 pounds 125 pounds metal @ .30 lb.	37.50	Casting weight, 5 pounds each 125 molds per day—625 pounds 625 pounds metal @ .30 lb.	187.50
Cleaning cost at .03 lb.	3.75	Cleaning cost at .03 lb.	18.75
Shrinkage 6%	2.25	Shrinkage 6%	11.25
	$ 59.50		$231.90
COST PER CASTING $2.38		**COST PER CASTING $1.85½**	

52½c PER CASTING SAVED OR $65.63 PER DAY, PLUS THE FACT THAT YOUR CUSTOMER RECEIVED PROMPT DELIVERY, BETTER CASTING DUE TO UNIFORM PARTING AND GATING.

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1 hr. Molders time	2.00
1 hr. Cleaning	1.75
* Aluminum Frame	13.50
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*Frame should not be included as it can be used for other jobs.

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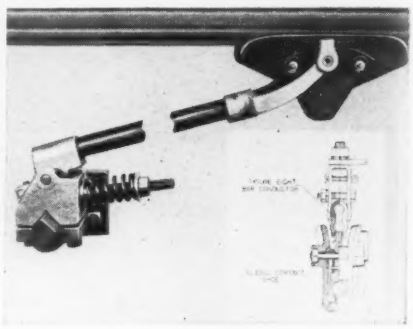
(*Continued from page* 356)

Guard turns under table when rabbeting wide stock and may be returned immediately—no adjustments necessary. Table is 60 in. long and 8 in. wide. Ribbed fence is 37 in. long, 4 in. wide and adjustable to 45 degrees. Jointer has capacity to cut 6 in. wide and ⅝-in. deep.

For More Details Circle No. 36—Page 347

Conductor Bar Insulation: Benbow Mfg. Co., 1285 Rollins Rd., Burlingame, Calif.—New trolley system is designed to insulate bare figure-8-bar conductors used to supply power to bridge cranes, monorail hoists, and



conveyors. It can be applied to existing conductors without dismantling, or installed as a completely new system. The system consists of two units: A sheath of insulation material, readily cut to any desired length, that snaps over the eight-bar conductor, and a sliding shoe collector, held against the insulated 8-bar conductor by spring action, adjustable from 2 to 10 psi. The sliding shoe makes contact with the conductor through a continuous, narrow opening at the bottom of the insulation sheath. The system will operate with curves, switches and crossovers, and is rated to 60 amp.

For More Details Circle No. 37—Page 347

Anchoring Mixture: Hallemite Mfg. Co., Dept. F, 2446 West 25th St., Cleveland 13—New compound sets anchor bolts for permanently fastening machinery, hand rails, seats, or equipment of any type to concrete. Applied cold, there is no heating hazard, and it sets within 15 to 20 minutes. A hole is drilled in the concrete, the bolt set in place, and the compound, mixed with water, poured into the hole around the bolt. The anchoring mixture is said to be self-bonding, self-leveling, oil-resistant and nonshrinking.

For More Details Circle No. 38—Page 347

Derusting: Enthone Inc., 442 Elm St., New Haven, Conn.—Alkaline derusting process for ferrous metals is said to clean as it derusts. The work to be derusted is made the cathode

in a solution of derusting compound for a few seconds to several minutes, depending upon surface condition. Longer treatment does not result in any attack upon the metal being pickled. Therefore, close watching of the pickling process is not required. If protection of the object being derusted is desired, zinc can be incorporated in the bath to enable cleaning, pickling and zinc plating, all in one tank.

For More Details Circle No. 39—Page 347

Maintenance Material: Flexrock Co., Filbert & Cuthbert, west of 36th St., Philadelphia 4—A liquid chemical to be mixed with cement or cement and sand produces a mortar that is handled easily, and fast setting for sealing off leaks and water seepage in concrete walls. Forced into an opening, even against hydrostatic presure, the material is said to seal off severe, fast-flowing leaks. Material also is recommended for plaster coating walls above or below ground or water level and for pointing up spalled areas.

For More Details Circle No. 40—Page 347

Grinding Wheel: Norton Co., Worcester 6, Mass.—Reinforced, flexible, hub type grinding wheel is said to perform rough and finish grinding and notching operations. Designed for use on right angle or sander type portable grinders, this wheel is made of carded web material impregnated with abrasive grain. It is light, strong, sufficiently flexible to permit blending of contours, and does a good polishing job, it is claimed. Should breakage occur, the web is designed to hold pieces together until the machine can be stopped.

For More Details Circle No. 41—Page 347

Labels: Labelon Tape Co., 450 Atlantic Ave., Rochester 9, N. Y.—Water-proof, oil-proof, and smudge-proof, pressure sensitive labeling tape

which can be written upon with pencil, stylus or typwriter is available in four colors and seven widths. The adhesive requires no moistening and adheres to glass, wood, metal, plas-

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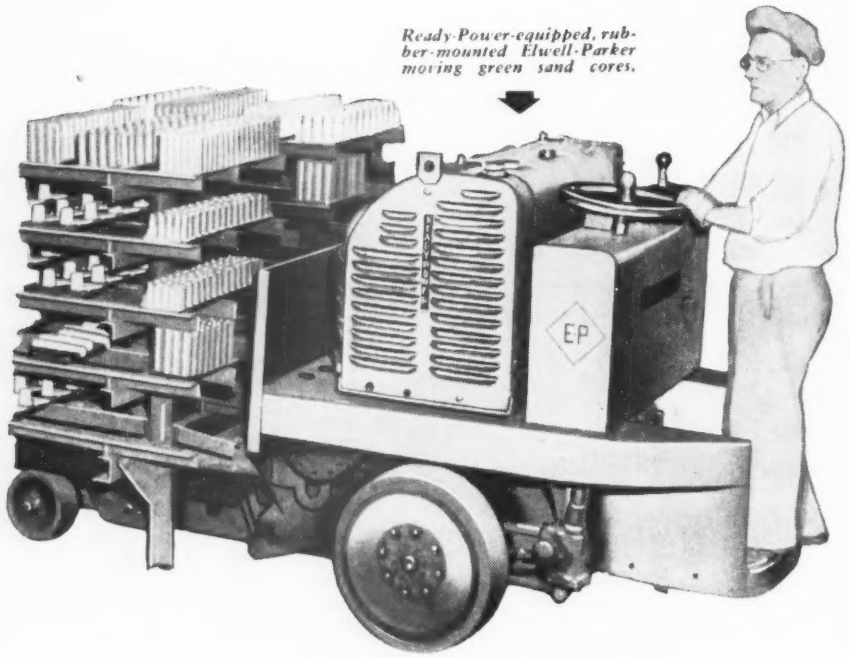

Ready-Power-equipped, rubber-mounted Elwell-Parker moving green sand cores.

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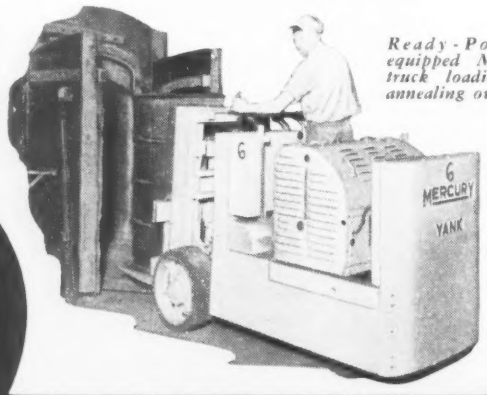
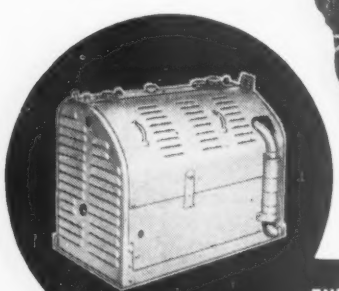


Ready-Power-equipped Mercury truck loading an annealing oven.



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tics, ceramics—to almost any hard surface, and the tape can be transferred repeatedly from one surface to another without leaving a sticky residue or destroying the adhesive qualities. Tape is offered in black, blue, red and green, ½, ⅝, ¾, 1, and 1½-in. widths in 400 and 800 in. rolls, and in blue only in 2-in. width. The tape is made from acetate, and is said not to discolor, curl up at the edges, or yellow with age. It can be wiped clean with a damp cloth, and will adhere with legible markings at temperatures from −40 to +160° F.

For More Details Circle No. 42—Page 347

Mercury Lamps: General Electric Co., Nela Park, Cleveland 12—Two new mercury lamps, designed for general lighting service, have reflectors built into the bulb, and ordinarily need no cleaning or other maintenance throughout their lives. They are 400-w lamps, 11¾ in. long and 6½ in. diam at the face. One lamp generates light of the regular mercury color and has a lumen output of 14,500, the other has a coating of phosphor on the inside face of the outer bulb to improve color quality of light, particularly in its effect upon the human complexion, and helps smooth out the light beam. Its output is 10,000 lumens. A 1000-w mercury lamp, producing 52,000 lumens, for general industrial use where medium or high bay lighting is desired, also is offered.

For More Details Circle No. 43—Page 347

Bin Vibrator: Cannon Vibrator Co., 111 Power Ave., Cleveland 14—End-mounted, 5-in. pneumatic vibrator weighs 180 lb. Its 55-lb piston has a stroke of 1⅝-in. and operates at a maximum rate of 650 strokes per minute at an operating pressure of 80 psi. Air cushioned operation eliminates metal-to-metal pounding for seminoiseless operation. Vibrator was designed for use on storage bins with capacity of 75 or more tons. The body has a hard, chrome-plated cylinder wall, hardened steel piston is centerless ground, and mounting plate has slotted bolt holes for easy, quick mounting or removal.

For More Details Circle No. 44—Page 347

Moistening Agent: Pelron Corp., 7740 West 47th St., Lyons, Ill.—Moistening agent was developed to add to sand mixes so that the sand would retain sufficient moisture to hold its shape and so that the water would wet the sand evenly. It is a light colored liquid, soluble in water in all proportions, nontoxic and noninjurious. It should be used at a concentration of 1/10 per cent in the water used for wetting sand.

For More Details Circle No. 45—Page 347

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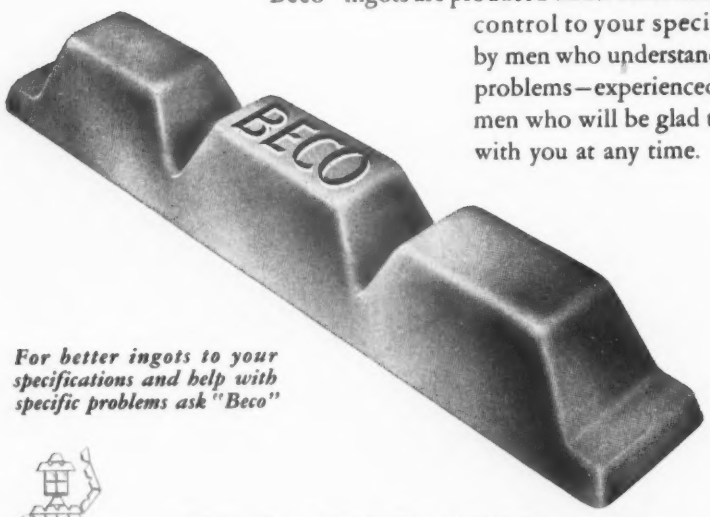

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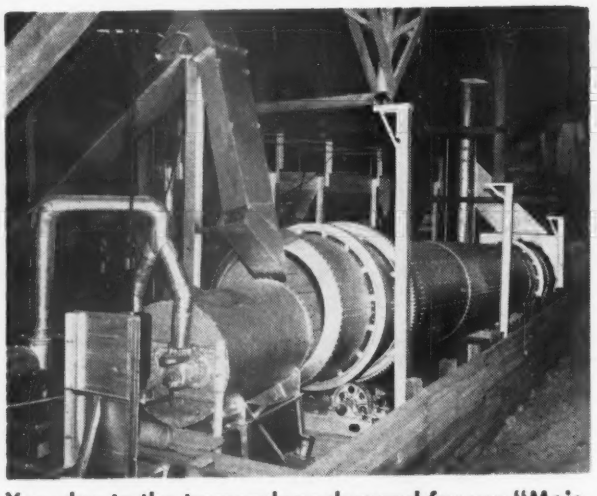

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The Ayers Mineral Company, Zanesville, O.

Atlantic City-Booth 222

Magnesium Sand Foundry Technology

(*Continued from page* 149)

properties of the cores also are good.

Gating and Risering—The proper gating and risering of castings is one of the most important and difficult tasks in the magnesium foundry. Until recently, the common gating system consisted of slotted rectangular sprues with a runner system around the bottom of the casting and numerous ingates to allow all the metal to enter the bottom of the casting. Nearly all foundries have an optimum relationship between the sprue area, the runner area and the ingate area. In general, the relationship is to have the total ingate area smaller than the area of the sprue or runner so that the system once filled with metal remains full during the entire pour.

Another feature of this gating system employs a triangular runner, with the base down, molded in the cope so that any dross or skins formed would float on the surface and the clean metal from the bottom of the runner would enter the casting. This system, when properly applied, promotes clean and sound castings. The obvious disadvantage is that all the metal enters through the bottom of the casting and the heated sand at that point must be rectified by using many heavy chills and very large risers to obtain the proper temperature gradients for directional solidification.

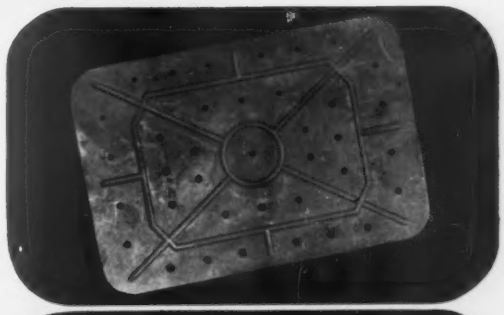
In recent years, other gating devices have been employed. For removing skins and dross, screens cut from tin-coated perforated steel sheet have replaced the larger triangular runner. The screens can be used in flat form standing upright in the runner or in the shape of cylinders at the base of vertical slot gates. For decreasing turbulence in pouring, tapered sprues with the small end down are often employed.

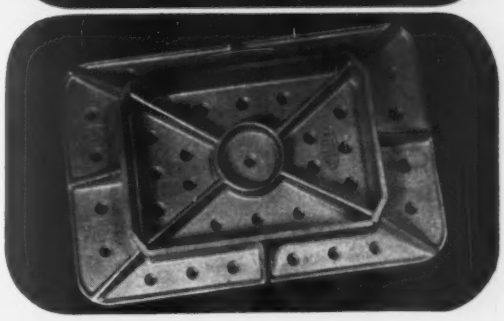
Magnesium Casting Defects—The number of castings scrapped in the magnesium production foundry may be greater than in the foundry casting other common metals, because magnesium castings are subject to more kinds of trouble and because the casting characteristics of magnesium alloys are not as good as those of some commonly used alloys. However, close technical control over all procedures involved in producing the castings will keep the defects at a minimum.

Probably the most prevalent defect found in magnesium castings is

(*Continued on page* 364)

Reduce the **LOAD** *with* MAGNESIUM





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1—AM-MAG True Level bottom boards reduce molder fatigue because they are light in weight and are easy to handle. Rigid design and proper venting produces castings true to pattern. Eliminates sagging and swelling.

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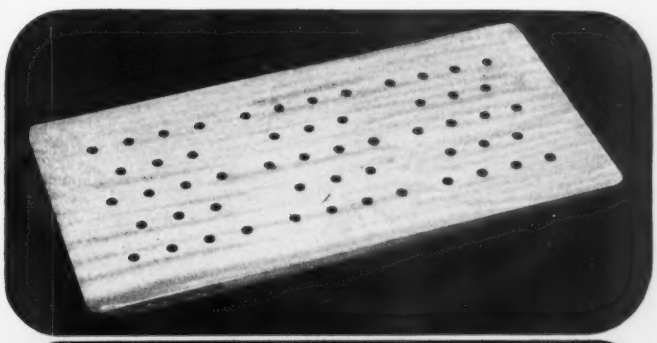

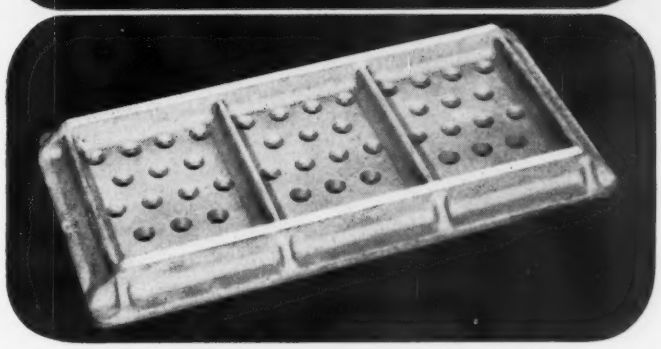

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2—AM-MAG Lo-Heat core plates handle easier in production, clean faster and reduce the core oven load since they absorb much less heat than other plates.

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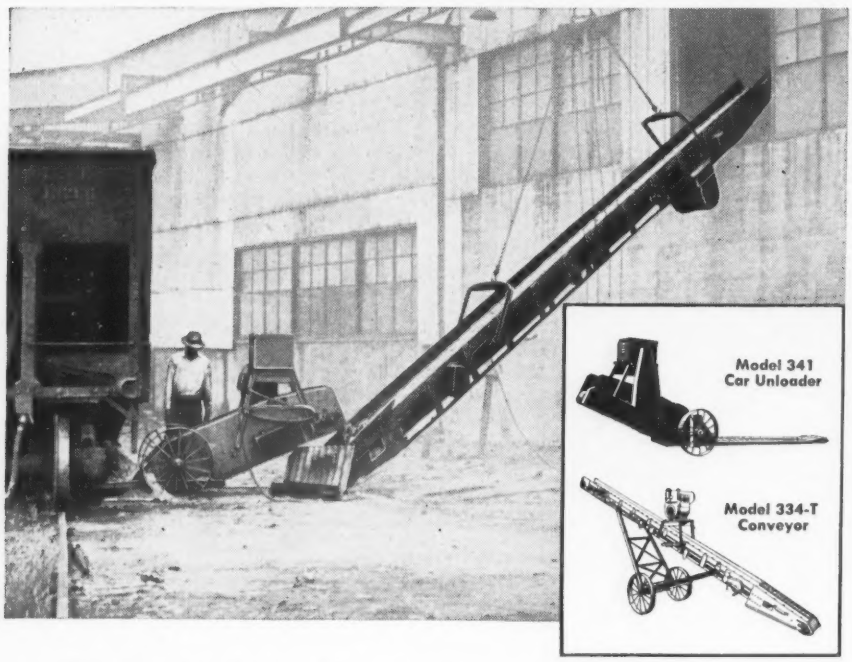

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(*Continued from page* 362)

sand holes caused by small pieces of molding or core sand breaking from the mold and falling or washing into the casting cavity. Sand holes may be prevalent in magnesium castings because the molding sand is coarser than that used with other nonferrous metals. Sand holes in magnesium castings can be reduced by maintaining the molding and core sand properties at established optimum values and maintaining pattern and corebox equipment in good condition. Design of the casting and gating system to eliminate sharp corners and projections of sand will reduce the number of sand holes.

The above causes are responsible for a large number of castings scrapped for sand holes; however, in common with all other metals, carelessness in producing the mold and in setting cores is probably the greatest single cause of sand holes in magnesium castings.

One Cause of Defect

Another casting defect that may occur in magnesium castings is known as a pop-blow. A pop-blow is the result of a reaction which occurs when molten magnesium comes in contact with a foreign substance imbedded in the surface of the mold cavity and which releases gas or vapor suddenly, leaving an essentially spherical void with a shiny surface and usually covered by a thin skin of metal. Blasting or pickling operations disclose this defect.

The elimination of pop-blows from castings can be accomplished by maintaining the molding sand in a clean condition free from foreign materials such as paper, wood, coal and other forms of trash. Lumps of inhibitor in the sand must also be avoided to prevent pop-blows. In common with other metals, poor venting of cores, hard ramming of the molding sand or a poorly designed gating system which traps bubbles of air may also cause blows. Blows from this source are perhaps more prevalent in magnesium castings because of the low density of the metal. Moisture collecting on chills or the use of bare metal chills are other sources of blows. To avoid blows from chills, they should be coated with an insulating spray. Large chills or ones which cover considerable area should be scored as an additional precaution.

Surface shrinks may cause a casting to be scrapped. Such defects are a result of poor gating or risering practices or the improper use of chills. Pouring at the wrong tem-

(*Concluded on page* 366)

Three-dimensional model of new Fairbanks, Morse foundry exhibited May 1 to 8 at Booth No. 1524, AFS Convention, Atlantic City.

Viewing it are Lester B. Knight, President; L. E. Everett, Vice President; and H. W. Maxon, Manager, Construction Engineering Division of Lester B. Knight & Associates, Inc.

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(*Concluded from page* 364)

perature may also result in visible shrinks.

Burning or reaction on the metal surface is a cause of scrap castings found especially in large castings or in the section of a casting through which a great deal of metal runs. The defect may be eliminated by raising the inhibitor content of the sand or by spraying the offending section of the mold with a solution containing sulphur or boric acid. Gating to more evenly distribute the metal entering the casting prevents the sand from overheating and eliminates burning or oxidation of the casting from this cause.

Flux in castings is not a major cause of scrap in most foundries but it may become a serious source if all the precautions discussed in the previous section on melting are not followed.

Misruns or cold shuts in magnesium castings are usually attributed to poor gating or pouring at the wrong temperature. Poor venting or low permeability of the sand may also cause this defect. Improper metal preparation which does not remove all the oxide inclusions may produce misrun castings by reducing the fluidity of the metal or, if screens are used in the mold, they may become plugged by the oxide. Following the recommended pouring practices outlined earlier will aid in preventing this type of defect.

Regulate Pouring Practice

Dross and skins in castings may be eliminated by careful attention to pouring practices and by gating to eliminate turbulence of the metal in filling the mold.

Hot cracks in castings may be caused by sharp corners on the castings, by hard cores or by hard ramming of the molding sand. Recommended metal treatment to produce fine-grain metal in the castings will greatly decrease the difficulty with cracks. Porosity in a section of the casting under stress during cooling will greatly increase the tendency of the section to crack.

Microporosity in magnesium castings may be a cause for rejection. This defect can be eliminated by careful attention to melting procedures and good gating and risering practices as previously discussed.

The complicated gates and risers used with magnesium alloys require more work on the castings in the trimming room than with other common metals. This may lead to increased scrap resulting from castings broken in handling, sawed into or ground into by careless operations in the trimming department. The only way to prevent this is to observe careful supervision in the department. Insofar as possible, the gates and risers should be placed in such a manner that they may be removed from the casting with maximum ease.

The defects just discussed are the major causes of scrap in the magnesium foundry. A review of these defects will show a very large proportion of the scrap castings can be attributed to failure to follow recommended practices and the special precautions needed for the founding of magnesium alloys.

The need for establishing standard procedures and for closely controlling these procedures in the production of castings is more apparent in the magnesium foundry than in the foundry casting other common metals. The establishment of these procedures will provide benefits in economy of production and in the quality of products sold.

Book Review

Forging and Forming Metals, by S. E. Rusinoff; fabricoid; 279 pages 5½ x 8 in.; published by American Technical Society; Drexel Ave. at 58th street, Chicago 37, Ill., price $3.95.

This book covers with inclusive thoroughness the mass of improvements which have been developed in recent years in the forging and metal forming field. Throughout the book explanations are supplemented by photographs and specially prepared drawings. In many instances the entire sequence is illustrated from the first operation on metal stock to the finished forging. Text and illustration cover impact forging, press forging, upset forging, extrusion, heat treatment, cleaning and finishing, inspection, safety, metal quality and the designing of forgings, tools and dies. For use as a class textbook, each chapter is followed by a list of review questions.

Offers Film and Booklet

Towmotor Corp., Cleveland, is distributing a booklet with every showing of its 15-minute sound-slide film entitled "What Makes It Tick?" to key production and operating executives interested in materials handling. Booklet carries the same title as the film on which it is based. It is a nontechnical analysis of the construction features of the company's fork lift trucks, with an explanation of how these features contribute to low cost, efficient handling of materials under varying conditions.

This **INSIGNIA**

Is Your GUARANTEE of Product Reliability Fostered Through Progressive *Group Activity and Leadership* in Serving the Foundry Industry

WHAT F.E.M.A. DOES:

- Fosters member co-operation
- Improves trade relations
- Promotes industry recognition
- Stimulates foundry research
- Co-operates with allied organizations
- Compiles trade information
- Stimulates better foundry equipment

May We Remind You:
"A Mechanized Foundry Benefits Everyone!"

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Ajax Flexible Coupling Company Inc.
Allis-Chalmers Manufacturing Company
Alloy Metal Abrasive Company
American Air Filter Company Inc.
American Wheelabrator & Equipment Corporation
The C. O. Bartlett & Snow Company
Beardsley & Piper, Div of Pettibone Mulliken Corporation
The Berkshire Manufacturing Company
Buell Engineering Company, Inc.
Edwin S. Carman, Inc.
Clearfield Machine Company
Cleveland Metal Abrasive Company
Davenport Machine & Foundry Company
Wm. Demmler & Bros.
Detroit Electric Furnace Div., Kuhlman Electric Company
Diamond Clamp & Flask Company
The Federal Foundry Supply Company
The Foundry Equipment Company
Foundry Services & Equipment Corporation
Giffels & Vallet, Inc.
Great Western Manufacturing Company
Herman Pneumatic Machine Company
Hickman, Williams & Company
Hines Flask Company
Hydro-Blast Corporation
Industrial Equipment Company
Iron Lung Ventilator Company
The Jeffrey Manufacturing Company
Link-Belt Company
The MacLeod Company
Mathews Conveyer Company
Modern Equipment Company
National Metal Abrasive Company
Newaygo Engineering Company
New Haven Vibrator Company
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Roots-Connersville Blower Corporation
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Tabor Manufacturing Company
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Vapor Blast Manufacturing Company
Wadsworth Equipment Company
W. B. Wallis, Pres. (Pittsburgh Lectromelt)
Whiting Corporation

FOUNDRY EQUIPMENT MANUFACTURERS ASS'N INC.

Address: Engineers Building, Cleveland 14, Ohio

...TRADE PUBLICATIONS...

For More Details on These Items Use Reply Card—Page 347

HOT BLAST: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill. —Booklet describes the use of hot blast in cupola furnaces. It provides information on advantages of using hot air for combustion and describes both the Griffin and Todd-Thermo processes. Explained are how hot blast increases the melting rate, produces hotter iron with less coke, lowers sulphur pick-up, reduces oxidation, improves working conditions, gives closer metallurgical control, and saves pig iron.

For More Details Circle No. 90—Page 347

GRAPHITE BRICK: National Carbon Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Catalog section S-6210 covers carbon and graphite brick, for application in the chemical, processing and metallurgical industries. Tables give brick sizes, shapes, grades and physical properties, with special information on graphite beams, blocks, plates and rods in sizes up to 24 x 30 x 180 in.

For More Details Circle No. 91—Page 347

WELDING ALLOYS: Eutectic Welding Alloys Corp., 172nd St. and Northern Blvd., Flushing 58, N. Y.—Directory of electrodes and welding alloys contains photographs, data and technical information on a series of low-temperature welding alloys for use on cast iron, steel, alloy steels, copper, brass, bronze, aluminum, magnesium, hard and machinable overlays and for cutting all metals.

For More Details Circle No. 92—Page 347

CONTROLLERS: Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Station 40, Wayne & Windrim Aves., Philadelphia 44—Catalog 8000 illustrates and describes vane type electric contact control units for use with models of the company's thermometers, pressure gages, potentiometers, and millivoltmeters, to give snap action on-off, two position or three position control.

For More Details Circle No. 93—Page 347

OIL HEATERS: Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y. —Catalog 714 describes oil tank suction heaters for heating heavy grades of fuel oil to pumping temperatures, and preheaters for raising oil from pumping temperature to the higher temperature required at the burners for good atomization, combustion and control.

For More Details Circle No. 94—Page 347

REFRACTORIES DATA: Ironton Fire Brick Co., Ironton, O.—Data booklet lists standard series fire brick, cupola blocks, wedge, key, arch and circle brick. Unit dimensions and quantities required to turn a circle are given, together with guides for estimating solid straight wall construction. Other tables give circumferences and areas of circles from 1/64 to 100 in. in diam and a practical conversion of pyrometric cone numbers into degrees Fahrenheit and Centigrade.

For More Details Circle No. 95—Page 347

FINISHING: Roto-Finish Co., 3700 Milham Rd., P. O. Box 988, Kalamazoo, Mich. — Booklet describes process for mechanical deburring, descaling, polishing, britehoning and coloring of intricately shaped products. A section tells how to select the proper machine and chips or finishing compounds to obtain best results.

For More Details Circle No. 96—Page 347

MICROSCOPE: Bausch & Lomb Optical Co., Dept. FF-1, Bureau of Education, Rochester 2, N. Y.—Booklet, "Theory of the Microscope," describes how a microscope works and discusses conditions which influence optical performance. Objectives, eyepieces, condensers, filters, and types of illumination are treated in a non-technical manner.

For More Details Circle No. 97—Page 347

MATERIAL HANDLING: Clark Equipment Co., Industrial Truck Division, 258 Champion St., Battle Creek, Mich.—Vol. 10, No. 2 of "Material Handling News" discusses handling techniques starting with the receiving dock, through storage, processing and assembly, warehousing and shipping.

For More Details Circle No. 98—Page 347

PRODUCTION CONTROL: Remington Rand Inc., 315 Fourth Ave., New York 10—Booklet X-1268, "Production Control Systems and Procedures," details a method of materials control that results in a shorter production planning cycle while speeding production by eliminating causes of production line delays.

For More Details Circle No. 99—Page 347

FACE GRINDERS: Grinder Division, Besly-Welles Corp., Beloit, Wis—Catalog bulletin describes radial head face grinders designed as multi-purpose tools especially to meet demands of mass production grinding operations. Specifications and examples of cost-cutting grinder applications are included.

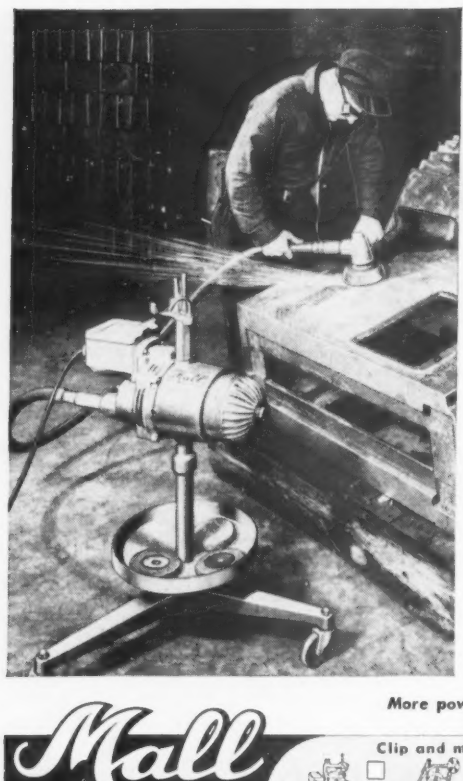
For More Details Circle No. 100—Page 347

FORK TRUCKS: Baker Industrial Truck Division, Baker-Raulang Co., 1250 West 80th St., Cleveland 2—Bulletin 1327 shows construction and operating features of the company's 2000-lb fork truck. Dimensions and specification sheets contain complete engineering information on the truck.

For More Details Circle No. 101—Page 347

ABRASIVES: Simonds Abrasive Co., Philadelphia 37—Form ESA-54

Less "Tool Handling"...More Production Means More Profit for You with MALL FLEXIBLE SHAFT MACHINES



Fast, lightest-weight power wherever you want it... vertically or horizontally. These are among the advantages of Mall units in dressing castings, grinding, drilling, buffing, sanding or polishing operations.

The Mall heavier-duty, constant speed motor gives you *power reserve*, nearly three times rated hp. on momentary overloads. Also, you get rugged machine construction. The shaft contains many layers of high carbon steel wire, wound under tension . . . treated to insure resilience. The strong spring steel liner of the housing provides a continuous shaft guide, preventing looping of shaft under load, protecting it from moisture, dust and injury.

Write for folder describing all Mall Flexible Shaft Machines.

40 Factory-Owned Service Warehouses, Coast To Coast, To Serve Our Customers and Thousands of Dealers

More power to the pound . . . less pounds to handle.

Mall TOOL COMPANY

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A 7066-½

describes nut-inserted and bolt-inserted abrasive disks and cylinders for horizontal or vertical spindle disk and surface grinding operations. Form ESA-65-A deals with abrasive mounted wheels and mounted points with removable spindles.
For More Details Circle No. 102—Page 347

MACHINING: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Catalog explains advantages and manufacturing short cuts said to be possible by contour machining with band tooled machines. A table of sawing and filing rates on various metals is included.
For More Details Circle No. 103—Page 347

ALLOYS: Ampco Metal Inc., 1745 South 38th St., Milwaukee 46—Bulletin G-1 describes alloys for use in bearings, gears, cams, dies, wear strips and similar uses. Corrosion resistant applications, physical properties and photomicrographs are included.
For More Details Circle No. 104—Page 347

GRINDING: Carborundum Co., Niagara Falls, N. Y.—Bulletins 21 and 22 in a series of 32 on all phases of grinding, deal with cutting off and with snagging and off-hand grinding. The entire series of grinding bulletins is offered as Form A-1204.
For More Details Circle No. 105—Page 347

MOISTURE TESTING: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Folder describes company's line of moisture tellers with tables of specifications covering each unit. Balance of the booklet covers scales and related equipment and desiccators.
For More Details Circle No. 106—Page 347

ELECTRO-ANALYSIS: Eberbach Corp., Ann Arbor, Mich.—Twenty-page manual outlines methods for the analysis of copper and lead by electro-analysis. The methods and bibliography are a product of research at Battelle Memorial Institute.
For More Details Circle No. 107—Page 347

VIBRATORS: Martin Engineering Co., Kewanee, Ill.—Folder describes a line of all-directional, noiseless type vibrators for facilitating movement of granular material in bins, pipes, hoppers, or chutes.
For More Details Circle No. 108—Page 347

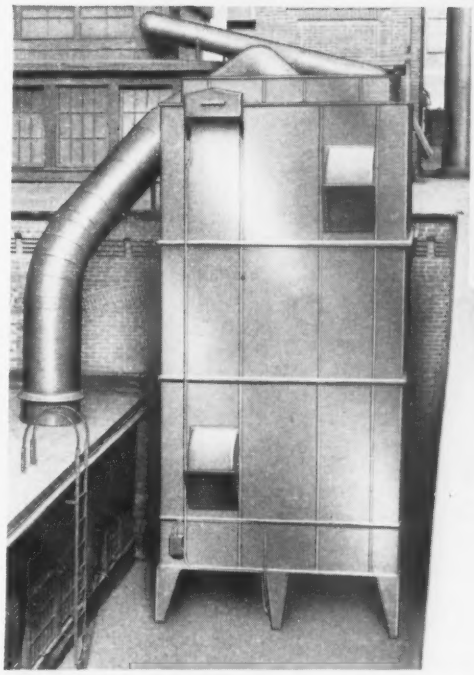
IMPREGNATION: Western Sealant Inc., 9042 Culver Blvd., Culver City, Calif.—Bulletin describes a process for eliminating porosity in metal castings and for bonding similar and dissimilar materials.
For More Details Circle No. 109—Page 347

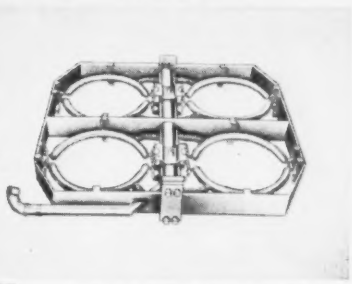
SHOT and GRIT: Cleveland Metal Abrasive Co., 887 East 67th St., Cleveland—Catalog 152 discusses the uses, advantages and proper selection of abrasive materials, including shot, grit and iron powder.
For More Details Circle No. 110—Page 347

FLEXIBLE DRIVES: Elliot Mfg. Co., 507 Prospect Ave., Binghamton, N. Y.—Catalog 210 contains specifications and accessory listings on a new line of flexible shaft unit drives.
For More Details Circle No. 111—Page 347

AEROTURN IS "ON THE JOB"

COLLECTING FOUNDRY DUST





AEROTURN'S EXCLUSIVE Blow Ring Cradle-Patented, fully automatic, self-adjusting, self-aligning blow ring assembly hold the rings snugly in contact with the wool felt filter bags at all times for maximum efficiency and filter bag service.

A typical case history of AEROTURN performance

THE PROBLEM: to efficiently collect and filter the dust from a large casting shake-out station and from sand-conditioning equipment at the modern, automatic foundry of Crompton & Knowles Loom Works, Worcester, Massachusetts.

THE SOLUTION by AEROTURN: a 22,000 C.F.M. AEROTURN Dust Collector installed on the foundry roof in only ⅓ the space and with only ½ the weight required for other type units of equivalent capacity. No additional structural support required in the building.

99.9+% filtering efficiency of AEROTURN allows recirculation of filtered air for working comfort and substantial savings in heating expense.

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READ ABOUT "UNIT ASSEMBLY" DESIGN FOR EASY INSTALLATION

WRITE FOR THIS BOOK — SEE HOW THE AEROTURN DUST COLLECTOR CAN SOLVE YOUR PROBLEM.

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COMPANY _____

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CITY _____ ZONE ___ STATE _____

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WATCH THE

Added Dollars

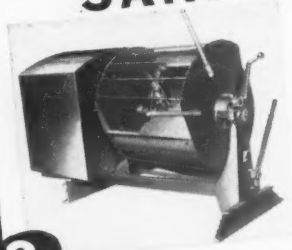
POUR IN

WITH THESE 3

PROFIT MAKERS

1

SAND MIXERS



Advanced design for exact charging, discharging — adjustable triple mixing hoes — removable abrasion resistant alloy steel drum liners.

2

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Precision cutting smoothly and safely. Unitized arm construction provides perfect alignment — reduces blade breakage (even under severe strains.)

3

JETLINERS

For patching cupolas pneumatically. Places high density—low moisture lining faster at lowest cost and with less attending care. Available with gas or electric power.

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AUTOMATIC • HEAVY DUTY

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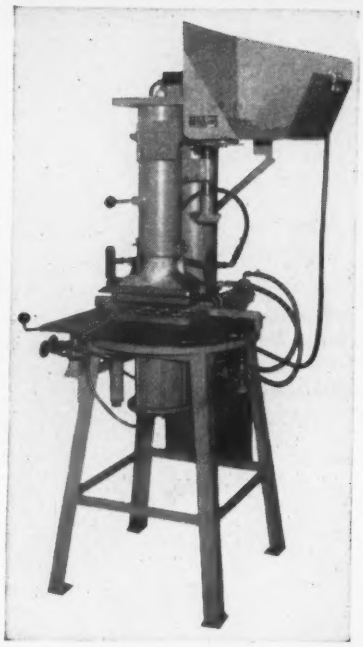

HIGH DRAW MODEL "C-H-E"

Cores up to 15 lbs.

With the operation of one lever on the hand machine, or pushing of one button on the electric cycle, this machine will —Close the Core Box—Blow the Cores—Vibrate the Box—Draw the Cores—and Eject the Core Box to position where the dryer is applied. Produces more cores with less operator fatigue, and more cores per hour.

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Let us figure on your requirements.

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Reduce Use of Chills in Gray Iron Casting

Now all you have to do to get hard chilled iron is add

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Comes in 1, 2, 3, and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 16-page article on the use of TELLURIUM in chill control.

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FOR NONFERROUS METALS FROM ACME SPECIAL FORMULA

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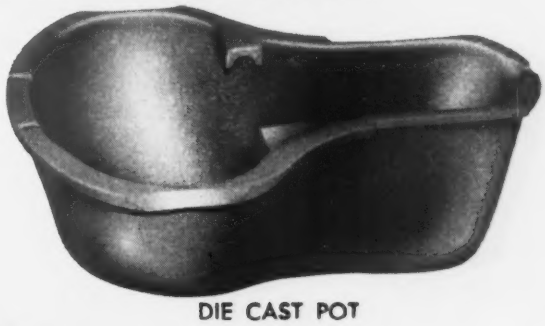

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HOLDING BOWL
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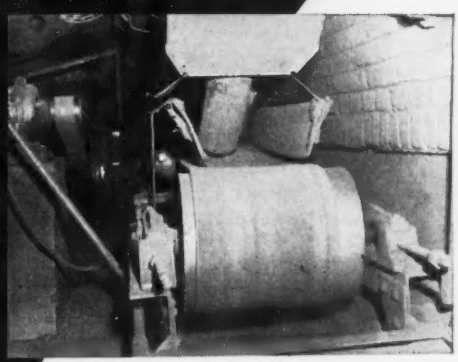
Conveying Hot Materials?



A Main ABC Hotstuff belt in service at a leading carbon producing plant carrying hot manganese ore at 450°F

Use **MAIN ABC HOTSTUFF . . .**

Main's hot materials belt gives superior performance at temperatures up to 600°F. . . . ideal for conveying hot foundry sand, cement, hot castings, phosphate, fuller's earth, etc. Main ABC Hotstuff's special construction dissipates heat—which means

- ***longer belt life***
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Dollar for dollar, Main ABC Hotstuff outperforms any belt in its range.

MAIN BELTING COMPANY
1241 Carpenter Street
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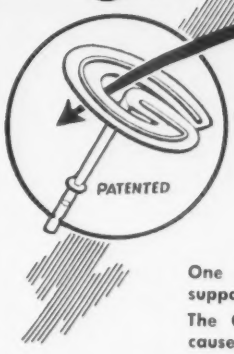
Protection against casting rejects--

OPEN HEAD



SHOULDER RADIATOR
CHAPLET

One cause of casting rejects is "loose" core support.

The Open Head Chaplet holds cores firmer because sand packs sounder under head and around the stem.

Try it—and see!

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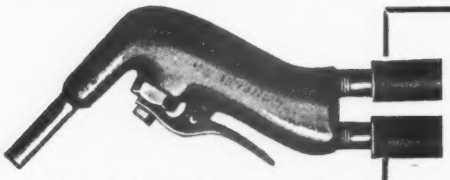
P. O. Box 5877, Cleveland, Ohio

WRITE FOR BULLETIN showing various types of Cleveland Chaplets.

CLEVELAND *Chaplets*
Since 1890

Eliminate—SWABS . . BRUSHES SPRAY CANS with the MURPHY PISTOL SPRAYER



OVER A MILLION SOLD TO DATE

The MURPHY PISTOL SPRAYER shoots blackening into hidden pockets beyond the reach of swabs. Jobs are completed faster and castings peel better and come cleaner. It is of great value in cleaning permanent molds, for aluminum and other metals as well as for sand blasting. For silica wash, oil, water or any liquid material and as a blow gun for cleaning parts and machinery. We guarantee this sprayer, designed by a practical foundryman . . . Write today!

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PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

HAMILTON SPRAY GUN

Complete with 4½ ft. suction hose and sinker . . . **$10.00 F.O.B.** Hamilton, O. *For spraying molds and cores with any liquid. For cleaning motors and machinery. For laying dust. Trigger control. Well made and guaranteed.*

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SPRAY GUNS • PISTOL SPRAYERS

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Moisture Elimination Up To 3000 Pounds Per Square Inch

HAUCK OIL AND GAS BURNING EQUIPMENT

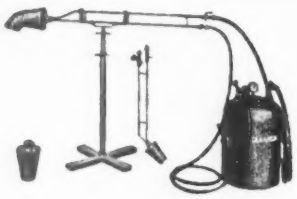
for
- CUPOLA LIGHTING
- MOLD DRYING
- LADLE HEATING
- CORE BAKING
- FURNACE HEATING

Featuring
3 BIG OPERATIONS WITH 1 EQUIPMENT

Compressed air portable oil burner equipment for lighting cupolas and drying molds. Also hand pump types.

Venturi compressed air "suction" hand torches — no preheating, for drying linings, cores, molds.

Portable venturi high pressure oil burners with adjustable burner stand for heating and drying ladles.



This Hauck All-Purpose Unit with interchangeable Burners and Nozzles, lights cupolas, heats ladles, dries molds. Fast, efficient—easy to handle. Burner flame adjustable and can be directed from any angle. Nothing like it for superior performance. Get Hauck Foundry Catalog.

HAUCK MANUFACTURING CO.
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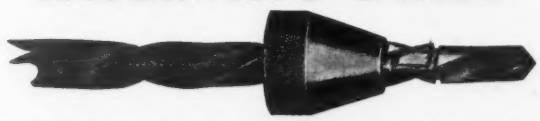
Venturi low pressure and high pressure air atomizing oil burners for ladle heating, core and mold ovens, melting and annealing furnaces.

SERVING YOU
in
"Core Blowing Operations"
INSERTING DRILL



- Uniformity of holes
- Faster insertion of vent
- Correct Depth

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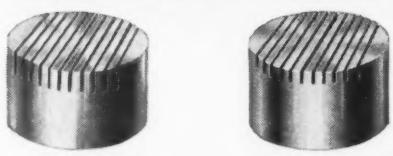

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A "blend" with JISCO is sound metallurgy.

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THE JACKSON IRON & STEEL *Company*

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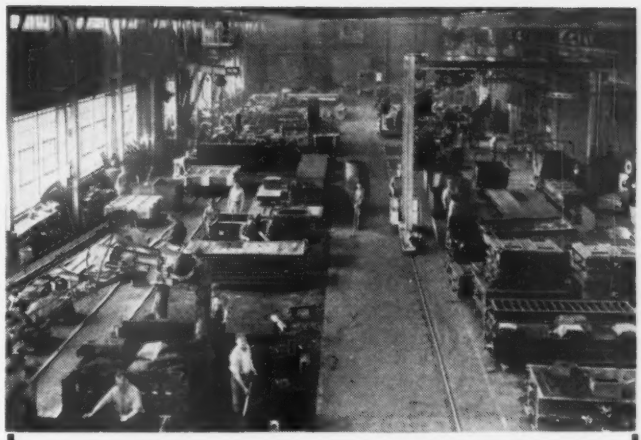

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The Johnson-March Dust Control System provides positive dust control at a cost averaging less than 1/10 of other systems.

Hundreds of installations are daily eliminating dust in various foundry operations. Unlike other dust control systems, the J-M System *eliminates dust at the source,* not after it has become airborne.

In foundries, the J-M System eliminates dust from:

FLOORS and WALKS—Prevents rising of dust from dirt floors and sand heaps.

SAND CONDITIONING OPERATIONS—Stops dust at the machines, prevents it from becoming airborne.

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CORE WORK, SAND FACINGS, SPRAYS

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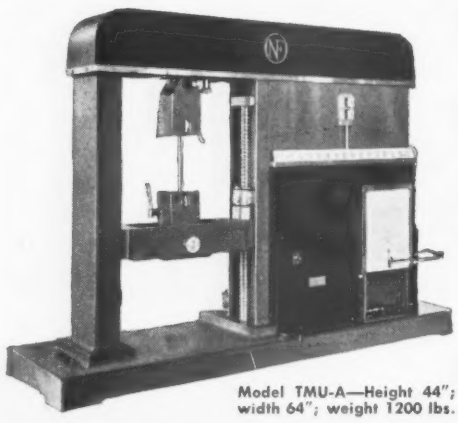

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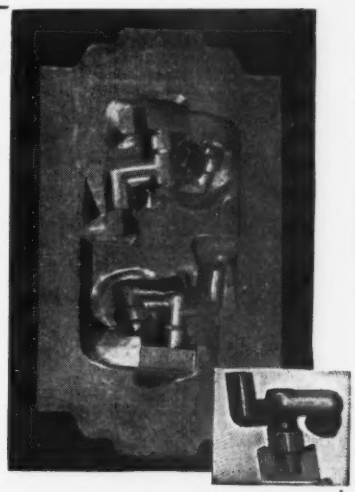

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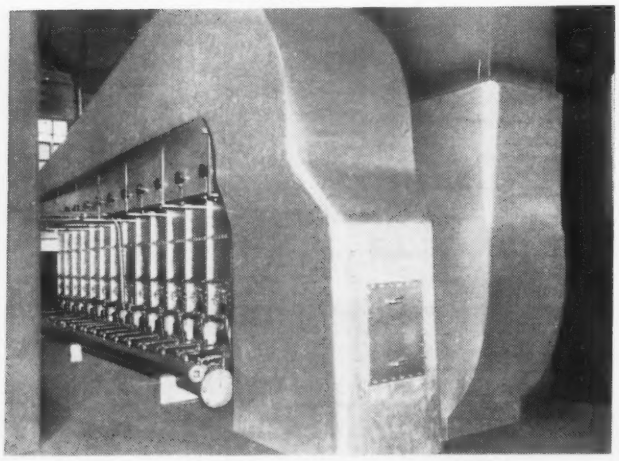

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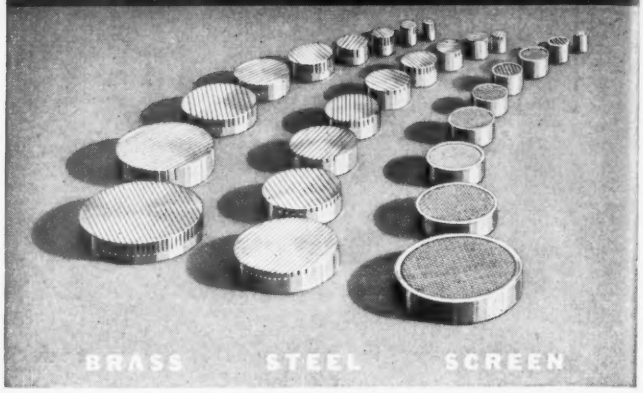

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Mesh: #30, #40, #50
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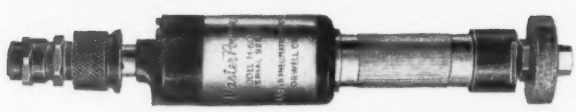

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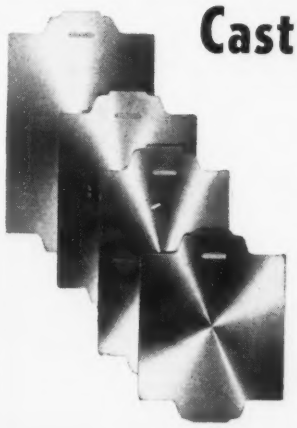

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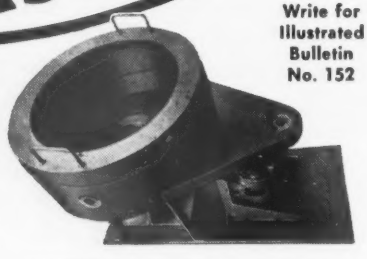

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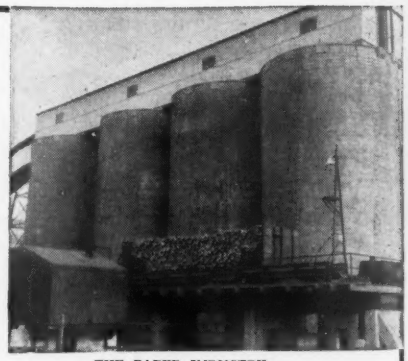

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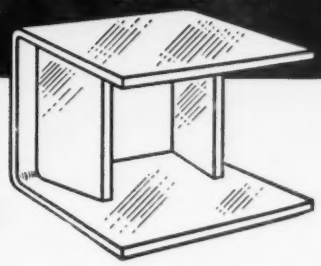

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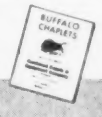

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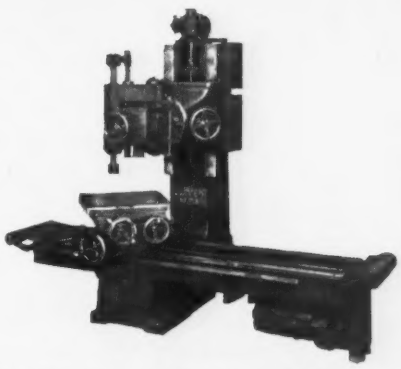

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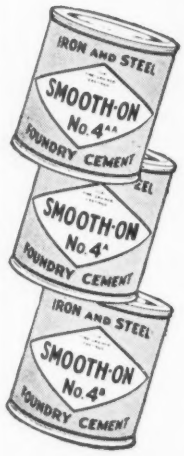

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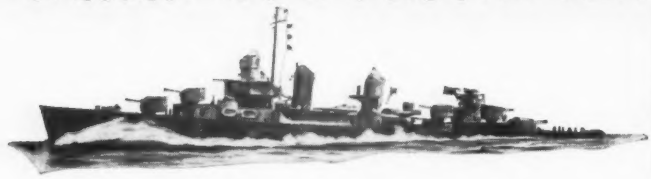

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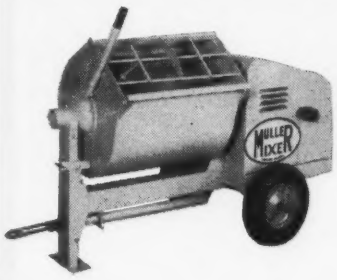

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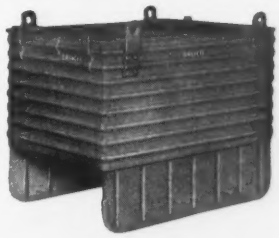

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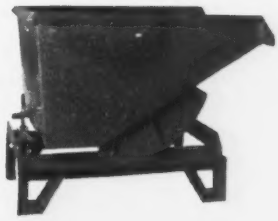

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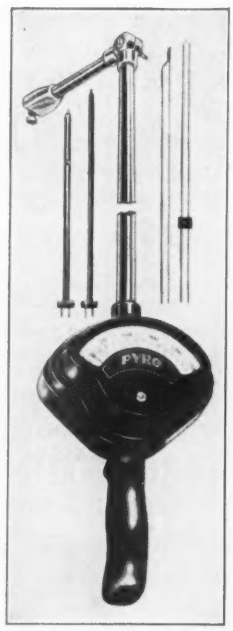

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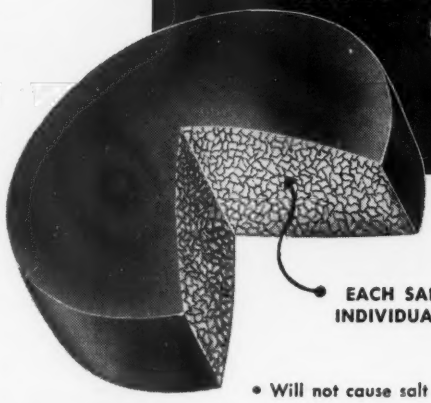

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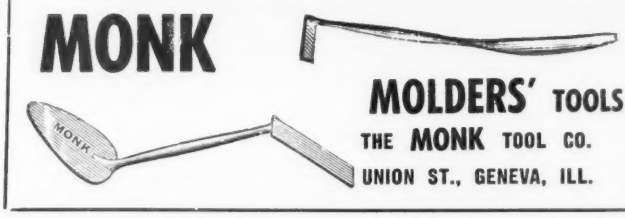

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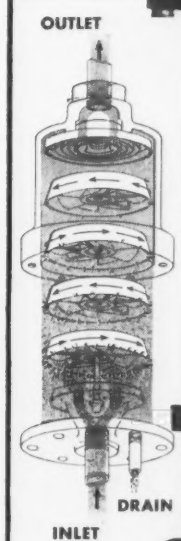

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BRIQUETS (Silicon Carbide)
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.

BRIQUETTING MACHINERY (Metal)
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BRUSHES (Wire Brushes)
Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Victor R. Browning Co., Inc., Willoughby, Ohio
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping) (Cont'd.)
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pekay Machine & Engineering Co., 100 N. LaSalle St., Chicago 2, Ill.
Penn Iron Works, Inc., Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.
Youngstown Steel Door Co., Euclid Superior Arcade, Cleveland, Ohio

BUFFING MACHINES
Bradford Machine Tool Co., 659 Evans St., Cincinnati, Ohio.

BUILDING and ENGINEERING SERVICE
American Bridge Co., Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
The North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

BUSHINGS (Flask-Pin)
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E. Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

CALCIUM BORIDE
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON BOOSTER
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

CARS (Core Oven)
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTING GRIPS (Air Powered)
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Centrifugal)
Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)
Centrifugal Casting Machine Co., Tulsa, Okla.

CASTING RESIN
Durez Plastics & Chemicals Co., North Tonawanda, N. Y.

CASTING SEALER
Empire Varnish Co., 2636 E. 76th St., Cleveland 4, Ohio.
Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

CASTINGS
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, Ohio.

CEMENT (Metallic)
Clark Cast Steel Cement Co., P.O. Box 21, Wilmington, Del.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

CEMENT (Refractory)
Bay State Abrasive Products Co., Westboro, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Norton Co., Worcester 6, Mass.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)
American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

CHAIN (Welded and Weldless)
American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Chisholm-Moore Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
S. G. Taylor Chain Co., Hammond, Indiana.

CHAINS (Sling)
S. G. Taylor Chain Co., Hammond, Ind.

CHAPLETS
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland Chaplet & Mfg. Co., 26479 Lakeland Blvd., Cleveland 23, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHEMICALS
Hercules Powder Co., Wilmington 99, Del.
Wm. F. Jobbins Co., Aurora, Ill.
Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Monsanto Chemical Co., 1700 S. 2nd St., St. Louis 4, Mo.

CHEMISTS
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.

CHILLS
Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS
Acheson Colloids Co., Port Huron, Mich.

CHILL NAILS
Standard Horse Nail Corp., New Brighton, Pa.

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)
Bedford Tool & Forge Co., 22 Interstate St., Bedford, Ohio
Cleco Division of Reed Roller Bit Co., Houston, Texas.
Independent Pneumatic Tool Co., Aurora, Illinois

CHROMIUM (Briquets)
Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

CLAMPS (Flask)
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Shanafelt Mfg. Co., Canton, Ohio
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CLAY (Bonding)
American Colloid Co., Merchandise Mart Plaza, Chicago 54, Ill.
Baroid Sales Division, 637 Railway Exchange Bldg., 80 East Jackson Blvd., Chicago 4, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Eastern Clay Products Dept. International Minerals & Chemical Corp 20 N. Wacker Dr., Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

CLAY (Refractory)
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.

CLEANING COMPOUNDS
Hooker Electrochemical Co., Buffalo Ave. & 47th St., Niagara Falls, N. Y.
Pelron Corp., 7740 West 47th St., Lyons, Illinois

CLEANING EQUIPMENT (Castings)
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Roto-Finish Co., 3600 Milham Road, Kalamazoo, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio

CLUTCHES (Magnetic)
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.
Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

COKE
Debevoise-Anderson Co., 295 Madison Ave., New York 17, N. Y.

COKE (Foundry)
DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
New England Coke Co., 250 Stuart St., Boston, Mass.
Philadelphia Coke Co., 4501 Richmond St., Philadelphia 37, Pa.
Pickands Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

COKE (Petroleum)
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

CONTAINERS
Youngstown Steel Door Co., Euclid-Superior Arcade, Cleveland, Ohio.

CONVERTER BLOWERS
Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN
Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.

CONVEYOR IDLERS
Transall Inc., 109 11th St., North, Birmingham 4, Ala.

CONVEYORS (Belt)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Boston Woven Hose & Rubber Co., 29 Hampshire, Cambridge 39, Mass.
A. B. Farquhar Co., 142 North Duke St., York, Pa.
Goodyear Tire & Rubber Co., Akron 16, Ohio.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Main Belting Co., 1217 Carpenter St., Philadelphia 47, Pa.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., Aurora, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity)
A. B. Farquhar Co., 142 North Duke St., York, Pa.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.
Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

CONVEYORS (Monorail)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Monorail) (Cont'd.)
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Richards-Wilcox Mfg. Co., Aurora, Ill.

CONVEYORS (Overhead)
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Inc., Reading, Pa.
Richards-Wilcox Mfg. Co., Aurora, Ill.

CONVEYORS (Pneumatic)
Crane Co., 836 South Michigan, Chicago 5, Ill.
Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)
A. B. Farquhar Co., 142 North Duke St., York, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Roller)
Westover Engineers, 3110 W. Fond Du Lac Ave., Milwaukee 10, Wis.

CONVEYORS (Rubber)
Goodyear Tire & Rubber Co., Akron 16, Ohio.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)
Ajax Flexible Coupling Co., Westfield, N. Y.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COPPER
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

COPPER SHOT
Alter Company, 1702 Rockingham Road, Davenport, Iowa.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries, Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.

CORE BINDERS
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Barrett Division, Allied Chemical & Dye Corp., 40 Rector Street, New York 6, N. Y.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N.Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Durez Plastics & Chemicals Co., North Tonawanda, N. Y.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., Bethesda, Maryland.
General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

CORE BINDERS (Cont'd.)
Monsanto Chemical Co., Plastic Division, Springfield 2, Mass.
Pelron Corp., 7740 West 47th St., Lyons, Illinois
Penola, Inc., Pittsburgh 1, Pa.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.
Werner G. Smith, Inc., 1730 Train Ave., Cleveland, Ohio.

CORE BLOWER BUSHINGS
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

CORE BLOWING MACHINES
Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harrison Machine Co., Wesleyville, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CORE BOX MACHINES
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

CORE BOXES
Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Industrial Pattern Works, 2621 West Belmont Ave., Chicago 18, Illinois.

CORE COLORING
Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

CORE COMPOUND
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Barrett Division, Allied Chemical & Dye Corp., 40 Rector Street, New York 6, N. Y.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Durez Plastics & Chemicals Co., North Tonawanda, N. Y.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., Bethesda, Maryland.
Pelron Corp., 7740 West 47th St., Lyons, Illinois.
Penola, Inc., Pittsburgh 1, Pa.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United Oil Mfg. Co., Erie, Pa.
Werner G. Smith, Inc., 1730 Train Ave., Cleveland, Ohio.

CORE DRAWING MACHINES
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.

CORE DRIERS
Industrial Pattern Works, 2621 West Belmont Ave., Chicago 18, Illinois.

CORE DRIERS (Dielectric)
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE FLUXES (Aluminum, Magnesium)
Pelron Corp., 7740 West 47th St., Lyons, Illinois.

CORE GRINDERS (Power Operated)
Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Dearborn, Mich.

CORE KNOCKOUT MACHINES
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harrison Machine Co., Wesleyville, Pa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Wadsworth Equipment Co., 555 Lafollette St., Akron, Ohio.

CORE OIL DISPENSING UNITS

Bowser,Inc., 1300 Creighton Ave. E, Fort Wayne 2, Indiana.

CORE OIL PUMPS & SYSTEM

Wilkinson Equipment Supply Corp., 6958 Wentworth Ave., Chicago 21, Ill.

CORE OILS

Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Pelron Corp., 7740 West 47th St., Lyons, Illinois
Penola, Inc., Pittsburgh 1, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., Erie, Pa.
Werner G. Smith, Inc., 1730 Train Ave., Cleveland, Ohio.

CORE OVENS

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Drying Systems, Inc., 1800 W. Foster Ave., Chicago 40, Ill.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Michigan Oven Co., 4500 Grand River Ave., Detroit 8, Mich.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PASTE

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PASTE (Cont'd.)

Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.

CORE PLATES (Magnesium)

Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

CORE PLATES (Steel, Asbestos)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE SAND

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Nugent Sand Co., Muskegon, Mich.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.
Pennsylvania Glass Sand Corp., First National Bank Bldg., Pittsburgh 22, Pa.
Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

CORE SAND MIXERS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Standard Sand & Machine Co., Blystone Div., 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Federal Foundry Supply Co., 4600 E. 71st St. Cleveland 5, Ohio.
Muller Machinery Co., Metuchen 1, N. J.
Multiplex Machinery Corp., Elmore, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Posey Iron Works Inc., Lancaster, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

CORE SPRAYERS

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.

CORE STRIPPERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
PMS Co., 1701 Power Ave., Cleveland 14, Ohio.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills, Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.

CORE WASH (Cont'd.)

Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Penola, Inc., Pittsburgh 1, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.
Titanium Alloy Mfg. Div, National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.

CORE WIRES

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

CORES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

CORES (Strainer) see STRAINER CORES

COUPLINGS (Air Line)

Cleco Division of Reed Roller Bit Co., Houston, Tex.
A. Schrader's Son 470 Vanderbilt Ave., Brooklyn 17, N. Y.

CRANE LUBRICATING SYSTEMS

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Electric Tramrail)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CRANES (Electric Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Hoist Div., American Chain & Cable Co., Inc., York, Pa.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Modern Equipment Co., Port Washington, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, Ohio

CRANES (Hand Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, Ohio
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp. Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES (Self-Propelled)

Coles Cranes Inc., P.O. Box 942, Joliet, Ill.
Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRAYONS (Marking)

Markal Co., 3052 W. Carroll, Chicago 12, Ill.

CRUCIBLES

American Refractories and Crucible Corp., North Haven, Conn.
Bay State Crucible Co., Taunton, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES

Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

CRUCIBLE LIFTERS

Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES

Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)

Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

CUPOLAS

Foundry Service and Equipment Corp., Markham, Ill.
Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLAS (Hot Blast Equipment)

Whiting Corp., Harvey, Ill.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Foundry Service and Equipment Corp., Markham, Ill.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT
Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS
Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.
Schneible Co., Claude B., Stephenson Bldg., Cass & Grand Blvd., Detroit 2, Mich.
Whiting Corp., Harvey, Ill.

CUPOLA LIGHTERS
Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., Harvey, Ill.

CUPOLA LININGS
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Ironton Fire Brick Co., Ironton, O.
United States Graphite Co., Saginaw, Mich.

CUPOLA PATCHING GUNS
Blastcrete Equipment Co., 11152 Santa Monica Blvd., Los Angeles 25, Calif.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

CUPOLA SPARK ARRESTORS
Claude B. Schneible Co., Stephenson Bldg., Cass & Grand Blvd., Detroit 2, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUTOFF MACHINES (Abrasive)
DoAll Co., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CYLINDERS (Air)
Bellows Company, Akron 10, Ohio.

DARK ROOM ACCESSORIES (X-Ray)
Eastman Kodak Co., Rochester, N. Y.
General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.
Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

DARK ROOM PROCESSING (Chemical Tanks, etc.)
Eastman Kodak Co., Rochester, N. Y.
Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

DEGASIFIERS
Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries, Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.

DEGRAPHITIZERS
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.

DEOXIDIZERS
Alter Company, 1702 Rockingham Road, Davenport, Iowa.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.

DEOXIDIZERS (Cont'd.)
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries, Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

DEOXIDIZERS (Ferrous)
Carborundum Co., Perth Amboy, N. J.

DESCALING (Salt Bath)
Hooker Electrochemical Co., Buffalo Avenue & 47th St., Niagara Falls, N. Y.

DESULPHURIZERS
American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Modern Equipment Co., Port Washington, Wis.
National Pigment Co., 2115 East York St., Philadelphia 25, Pa.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES
Kux Machine Co., 6725 North Ridge Ave., Chicago 26, Ill.
Miller-Taylor Tool Co., 5005 Euclid Ave., Cleveland 3, Ohio.

DOWEL PINS
Standard Horse Nail Corp., New Brighton, Pa.

DRILLS (Electric)
Mall Tool Co., 7720 So. Chicago Ave., Chicago 19, Ill.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

DRILLS (Pneumatic)
Gardner-Denver Co., Quincy, Ill.
Mall Tool Co., 7720 So. Chicago Ave., Chicago 19, Ill.
Schramm Inc., West Chester, Pa.

DRYING OVENS
Drying Systems, Inc., 1800 W. Foster Ave., Chicago 40, Ill.

DRUMS (Magnetic)
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.
Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

DUMP HOPPERS
Brummeler Steel Products Co., Grand Rapids, Mich.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS
Frank G. Hough Co., Libertyville, Ill.
Kwik-Mix Co., Port Washington Wis.
Prime Mover Co., Muscatine, Iowa.

DUST ARRESTING EQUIPMENT
American Air Filter Co., Inc. 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.

DUST ARRESTING EQUIPMENT (Cont'd.)
Pangborn Corp., Hagerstown, Md.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Schneible Co., Claude B., Stephenson Bldg., Cass & Grand Blvd., Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Turner & Haws Engineering Co., 87 Gardner St., West Roxbury 32, Mass.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS
American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6101 Harvard Ave., Cleveland, O.
Foundry Service and Equipment Corp., Markham, Ill.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corp., Hagerstown, Md.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Claude B. Schneible Co., Stephenson Bldg., Cass & Grand Blvd., Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Turner & Haws Engineering Co., 87 Gardner St., West Roxbury 32, Mass.
Whiting Corp., Harvey, Ill.

DUST CONTROL (Chemical)
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.

DUST RECOVERY SYSTEMS
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Dracco Corp., 4063 East 116th St., Cleveland 5, Ohio.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corp., Hagerstown, Md.

DYES & CHEMICALS
Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

ELECTRIC FURNACES (see Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS
Standard Conveyors Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

ELEVATORS (Pneumatic, Material Handling)
Fuller Co., Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)
Automatic Foundry Equipment Div., W. G. Reichert Engineering Co., 1060 Broad St., Newark 2, New Jersey.
Foundry Service & Equipment Corp., 16231 Turner Ave., Markham, Ill.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Westover Engineers, 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

EXHAUST SYSTEMS
American Air Filter Co., Inc., Louisville 8, Ky.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Pangborn Corporation, Hagerstown, Md.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Schneible Co., Claude B., Stephenson Bldg., Cass & Grand Blvd., Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

FABRICATORS (Metal)
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Penn Iron Works, Inc., Reading, Pa.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS
Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Deta Oil Products Co., Milwaukee 9, Wis.
Joseph Dixon Crucible Co., Monmouth St., Jersey City, N. J
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E 42nd St., New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 16, Mich.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Pangborn Corp., Hagerstown, Md

FASTENERS (Conveyor Belt)
Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

FEEDERS (Belt)
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J

FEEDERS (Rotary)
Fuller Company, Catasauqua, Pa
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Vibrating)
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

FERROBORON
Electro Metallurgical Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME
Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Cleveland, O.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp., of America, 420 Lexington Ave., New York, N. Y

FERROCOLUMBIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

FERROMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp. 30 E. 42nd St., New York 17, N. Y.

Ohio Ferro-Alloys Corp. Canton 2, O.

FERROMOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Jackson Iron & Steel Co., Jackson, O.

Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.

Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

Ohio Ferro-Alloys Corp., Canton 2, O.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Titanium Alloy Mfg. Div. National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILLET (Leather)

Milwaukee Leather Belting Co., 1114 No. Water St., Milwaukee, Wis.

FILM (X-Ray)

Eastman Kodak Co., Rochester, N. Y.

General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

FILTERS (Air)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FIRE BRICK

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.

Carborundum Co., Perth Amboy, N. J.

Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

Illinois Clay Products Co., Joliet, Ill.

Norton Co., Worcester 6, Mass.

Stevens Inc., Frederic B., Detroit 16, Mich.

FIRE CLAY

Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

Illinois Clay Products Co., Joliet, Ill.

Ironton Fire Brick Co., Ironton, O.

FIRE SAND

Carborundum Co., Niagara Falls, N. Y.

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FIRESTONE

Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FLASK BANDS

Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASK BUSHINGS

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.

Hines Flask Co., 3431 W. 140 St., Cleveland 11, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Universal Engineering Co., Frankenmuth, Mich.

FLASK CLAMPS

S. Obermayer Co., 2563 West 18th St., Chicago 8, Ill.

FLASK PINS

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.

Hines Flask Co 3431 W. 140th St., Cleveland 11, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Universal Engineering Co., Frankemuth, Mich.

FLASKS (Aluminum, Magnesium)

Adams Co., Dubuque, Iowa.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASK FILLERS

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

Jeffrey Mfg. Co., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.

Fremont Flask Co., Fremont, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.

Fremont Flask Co., Fremont, O.

FLASKS (Snap) (Cont'd.)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.

Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

Pressed Steel Flasks Inc., Eaton Rapids, Michigan.

Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK FITTINGS

Adams Co., Dubuque, Iowa.

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.

FLASK LIFT MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.

Rietz Lumber Co., 1810 N. Central Park Ave., Chicago, Ill.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.

Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.

FLEXIBLE COUPLINGS

Ajax Flexible Coupling Co., Westfield, N. Y.

FLEXIBLE SHAFT MACHINERY

Mall Tool Co., 7740 South Chicago Ave., Chicago 19, Ill.

FLOORING

Norton Co., Worcester 6, Mass.

FLUXES

Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.

Bassichis Co., 2323 West 38th St., Cleveland, Ohio.

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.

Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

National Pigment Co., 2115 East York St., Philadelphia 25, Pa.

Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, N. Y.

Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

Puro-Seal Co., 2323 West Third, Cleveland 13, Ohio.

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY ENGINEERS

Automatic Foundry Equipment Div., W. G. Reichert Engineering Co., 1060 Broad St., Newark 2, New Jersey.

FOUNDRY ENGINEERS (Cont'd.)

Edwin S. Carman, 1643 Lee Road Cleveland 18, Ohio.

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

Lester B. Knight & Associates Inc., 600 West Jackson Blvd., Chicago 3, Oll.

A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY LAYOUT & METHODS

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.

Lester B. Knight & Associates, Inc. 600 West Jackson Blvd., Chicago 3, Ill.

FOUNDRY NAILS

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.

Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.

Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O

Foundries Materials Co., Coldwater, Mich.

Foundry Equipment & Supply Co., 2970 West Grand Blvd., Detroit 2, Mich.

Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.

Stevens, Inc., Frederic B., Detroit 16, Mich.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.

Cambell-Hausfeld Co., Harrison, O.

Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.

FURNACES (Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.

Despatch Oven Co., Minneapolis 14 Minn.

Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

Electric Furnace Co., West Wilson St., Salem, Ohio.

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

Johnston Mfg. Co., Minneapolis 13, Minn.

Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

Ohio Crankshaft Co., 3800 Harvard Road, Cleveland 1, Ohio.

FURNACES (Crucible Melting)

Ajax Eltrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Electric Melting)

Ajax Electric Furnace Corp., 46 Richmond St., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)

Allis-Chalmers Mfg Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave. Cleveland 15, Ohio.
Eclipse Fuel Engineering Co. 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnaces Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh Pa.
Reda Pump Co., Bartlesville Oklahoma
Whiting Corp., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., West Wilson St. Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.

FURNACES, HEAT TREATING (Electric) (Cont'd.)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Ohio Crankshaft Co., 3800 Harvard Road, Cleveland 1, Ohio.

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Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

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Electric Furnace Co., West Wilson St., Salem, Ohio.
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Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

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Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

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Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
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FURNACES (Powdered Coal)

Foundry Service and Equipment Corp., Markham, Ill.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P.O. Box 1125, Pittsburgh, Pa.
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Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
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Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill
National Carbon Co. Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
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Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Squeeze)

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div., Pettibone-Mulliken Corp. 2424 No. Cicero Ave., Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING SANDS

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Foundries Materials Co., Coldwater, Mich.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.
Ottawa Silica Co., Ottawa, Ill.
Pennsylvania Glass Sand Corp., First National Bank Bldg., Pittsburgh 22, Pa.
Sargent Sand Co., 2840 Bay Road, Saginaw, Mich.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONOGRAMS & TRADE MARKS

H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio.

MONORAIL SYSTEMS

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., Harvey, Ill.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Baldor Electric Co., 325 West Huron St., Chicago 10, Ill.
Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MOUNTING PADS, MOLDING & SHAKEOUT MACHINES

Fabreeka Products, Inc., 222 B Summer St., Boston, Mass.

NAILS (Chill)

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.

NITROGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

OIL BURNERS

Hauck Manufacturing Co., 106 Tenth St., Brooklyn 15, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

OPEN HEARTH DOORS

Wm. M. Bailey Co., Pittsburgh 16, Pa.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Michigan Oven Co., 4544 Grand River Ave., Detroit 8, Mich.
Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12, Mich.

OVENS (Mold)

Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.

OVENS (Mold Drying)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Michigan Oven Co., 4500 Grand River Ave., Detroit 8, Mich.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

PAINTS (Graphite)

Joseph Dixon Crucible Co., Monmouth St., Jersey City, N. J.

PARTING COMPOUND (Silicone)

Dow Corning Corp., Midland, Mich.

PARTING COMPOUNDS

Acheson Colloids Co., Port Huron, Mich.
Delta Oil Products Co., Milwaukee 9, Wis.

PARTING COMPOUNDS (Cont'd.)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Pennsylvania Pulverizing Co., First National Bank Bldg., Pittsburgh 22, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

Acheson Colloids Co., Port Huron, Mich.
American Lacquer Solvents Co., Phoenixville, Pa.
McDougall-Butler Co., 2929 Main St., Buffalo 14, N. Y.
PMS Co., 1701 Power Ave., Cleveland 14, Ohio.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN COATING (Rubber)

Foundry Rubber Inc., Bethesda, Maryland.

PATTERN COMPOUND

Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
H. P. Maughlin Co., 953 Ingleside Ave., Columbus, Ohio.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Rietz Lumber Co., 1810 N. Central Park Ave., Chicago, Ill.

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, New York.

PATTERN PLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Central Pattern Co., Quincy, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Plaster Process Castings Co., 6022 Carnegie Ave., Cleveland 3.
PMS Co., 1701 Power Ave., Cleveland 14, Ohio.
Pressure Match Plate Co., 1013 N. Front St., Philadelphia 23, Pa.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.
Arthur E. Will, 643 West 11th St., Erie, Pa.

PATTERN SHOP EQUIPMENT

Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Milwaukee Leather Belting Co., 1114 No. Water St., Milwaukee, Wis.
Oliver Machinery Company, Grand Rapids 2, Mich.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

PATTERNS (Plastic)

Central Pattern Co., Quincy, Ill.

PATTERNS (Wood, Metal)

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Anderson Pattern Inc., Muskegon Heights, Mich.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo N. Y.

PATTERNS (Wood, Metal) (Cont'd.)

Central Pattern Co., Quincy, Ill.
Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Howard Foundry Co., 1700 N. Kostner, Chicago 39, Ill.
Industrial Pattern Works, 2621 West Belmont Ave., Chicago 18, Illinois.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Wellman Bronze & Aluminum Co., 2525 E. 93rd St., Cleveland 4, O.
Arthur E. Will, 643 West 11th St., Erie, Pa.

PERMANENT MOLDS

Centrifugal Casting Machine Co., Tulsa, Okla.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PERMANENT MOLD CASTING

Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental-Copper & Steel Industries Inc., 2200-2214 Elmwood Ave., Buffalo 23, New York.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co., Rochester, N. Y.
General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.

PHOTOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.

PIG CASTING MACHINES

Wm. M. Bailey Co., Pittsburgh 16, Pa.

PIG IRON

Debevoise-Anderson Co., 295 Madison Ave., New York 17, N. Y.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Jackson Iron & Steel Co., Jackson, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

PINS (Flask)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.
Universal Engineering Co., Frankenmuth, Mich.

PISTON RINGS

National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PISTON RINGS (for Molding Machines, Compressors, etc.)

Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.

PLANT ENGINEERING SERVICE

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

PLATES (Bottom)

Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.
Shanafelt Mfg. Co., Canton, Ohio
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

PLATES (Core Drying)

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.
Johns-Manville, 22 East 40th St., New York 16.

PLUMBAGO

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Superior Flake Graphite Co., 33 South Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Schramm Inc., West Chester, Pa.

POLISHING MACHINES

Bradford Machine Tool Co., 659 Evans St., Cincinnati, Ohio.

POURING DEVICES

Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

PRECIPITATION (Liquid)

Johnson March Corp., 1724 Chestnut St., Philadelphia 3, Pa.

PRESSER BOARDS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Christiansen Corp., 1515 No. Kilpatrick, Chicago 51, Ill.

PRESSURE RECORDERS

Foxboro Company, Foxboro, Mass.

PROTECTIVE MATERIALS (X-Ray)

General Electric Co., X-Ray Dept., 4855 Electric Ave., Milwaukee 14, Wis.
Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

PULLEYS (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Homer Mfg. Co., Lima, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.
Stearns Magnetic Inc., 650 South 28th St., Milwaukee 46, Wis.

PUMPS

Construction Machinery Co., Waterloo, Iowa.
Gardner-Denver Co., Quincy, Ill.
Worthington Pump & Machinery Co., Harrison, N. J.

PUMPS (Dry, Vacuum)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

PUMPS, OIL (Core and Mold)

Wilkinson Equipment Supply Corp., 6958 Wentworth Ave., Chicago 21, Ill.

PURIFIERS

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.

PUSH-OFF MACHINES

Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div. Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

PUTTY (Foundry)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

PYROMETERS

Elematic Equipment Corp., 1150 W. Marquette, Chicago 2, Ill.
Foxboro Company, Foxboro, Mass.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.
Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Immersion)

Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Optical)

Pyrometer Instrument Co., Bergenfield, N. J.

RACKS (Core Ovens)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Eastman Kodak Co., Rochester, N. Y.
Radium Chemical Co., Inc., 161 East 42nd St., New York 17, N. Y.
Tracerlab, Inc., 130 High Street, Boston 10, Mass.

RADIUM

Radium Chemical Co., Inc., 161 East 42nd St., New York 17, N. Y.

REFRACTORIES

Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

REFRACTORIES (Cont'd.)

Joseph Dixon Crucible Co., Monmouth St., Jersey City, N. J.
Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Electro Refractories & Abrasive Corp., Vars Bldg., Buffalo 2, N.Y.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Keystone Refractories Co., 120 Liberty St., New York 6, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Norton Co., Worcester 6, Mass.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Richard C. Remmey Son Co., Hedley St. & Delaware River, Philadelphia 37, Pa.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.

REGULATORS (Gas or Oil)

The North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

RESIN (Shell Mold)

Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.
General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., 1700 S. 2nd St., St. Louis 4, Mo.

RESPIRATORS

Wilson Products Inc., Reading, Pa.

RIDDLES (Electric)

Champion Foundry & Machine Co., 2424 N. Cicero, Chicago 39, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

RIDDLES (Hand)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

RISER COMPOUNDS

Foundry Services, Inc., 280 Madison Avenue, New York 16, N. Y.

ROD DIP

Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

ROD STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

ROLLER-HEARTH FURNACES (Electric Annealing)

General Electric Co., Schenectady, N. Y.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

ROLLERS (Conveyor)

Transall Inc., 109 11th St., North, Birmingham 4, Ala.

RUBBER LINING MATERIAL (Abrasive Resisting)

Pangborn Corp., Hagerstown, Md.

SAFETY CLOTHING

American Optical Co., Southbridge, Mass.
B. F. McDonald Co., 5721 West 96th St., Los Angeles 37, Calif.
Pangborn Corp., Hagerstown, Md.
Safety Clothing & Equipment Co., 7016 Euclid Avenue, Cleveland 3, Ohio.

SALT & SALT TABLETS

U. S. Safety Service Co., 1215 McGee St., Kansas City 6, Mo.

SAND (Core Molding)

Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.

SAND (Core, Molding, Blasting)

American Silica Sand Co., Central Life Bldg., Ottawa, Ill.
Ayers Mineral Co., Zanesville, Ohio.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Nugent Sand Co., Muskegon, Mich.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Glass Sand Corp., First National Bank Bldg., Pittsburgh 22, Pa.
Producers Core Sand Corp., Michigan City, Ind.
Sargent Sand Co., 2540 Bay Road, Saginaw, Mich.
Titanium Alloy Mfg. Div., National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SAND BLAST BARRELS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND BLAST CABINETS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SAND BLAST EQUIPMENT

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
The Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Illinois.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAND BLAST NOZZLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Company, Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND BLAST ROOMS

American Wheelabrator & Equipment Co., Washawaka, Ind.
Macleod Co., 2232 Bogen St., Cincinnati, Ohio.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND BLAST TABLES

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

SAND CONTROL & TESTING EQUIPMENT

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND CONVEYING and HANDLING EQUIPMENT

Ajax Flexible Coupling Co., Westfield, N. Y.
American Air Filter Co., Louisville 8, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.

SAND CONVEYING and HANDLING EQUIPMENT (Cont'd.)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Crane Co., 836 South Michigan, Chicago 5, Ill.
Frank G. Hough Co., Libertyville, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, 14, O.
Pekay Machine & Engineering Co., 100 N. LaSalle St., Chicago 2, Ill.
Penn Iron Works, Inc., Reading, Pa.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Youngstown Steel Door Co., Euclid-Superior Arcade, Cleveland, Ohio.

SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)

Crane Co., 836 South Michigan, Chicago 5, Illinois.
Fuller Company, Catasauqua, Pa.

SAND DRYERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.
Crane Co., 836 South Michigan, Chicago 5, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

SANDERS (Pneumatic)

Cleco Division of Reed Roller Bit Co., Houston, Texas.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Budnick Mfg. Co., Grand Rapids 2, Michigan.
Standard Sand & Machine Co., Blystone Division, 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Muller Machinery Co., Metuchen 1, N. J.
Multiplex Machinery Corp., Elmore, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pekay Machine & Engineering Co., 100 N. LaSalle St., Chicago 2, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Budnick Mfg. Co., Grand Rapids 2, Michigan.

SAND PREPARATION EQUIPMENT (Cont'd.)

Clearfield Machine Co., Clearfield, Pa.
Denver Equipment Co., 1400 17th St., Denver 17, Colo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
The Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Illinois.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Moulders Friend, Dallas City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pekay Machine & Engineering Co., 100 N. LaSalle St., Chicago 2, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.
States Engineering Corp., 922 W. Berry, Ft. Wayne 2, Ind.

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Practical man to head nonferrous operation. New foundry in New Jersey offers right man stock interest for token investment. Must be expert in aircraft aluminum castings as well as other metals to government specs. Prefer man with some following whose name is well known to the industry. Address: Box 860, FOUNDRY, Cleveland 13, Ohio.

PLANT ENGINEER AND MASTER MECHANIC

Young engineer, preferably M.E. to specialize in preventive maintenance and plant engineering. Progressive mechanized foundry in North Eastern Ohio . . . Fine opportunity for good man. Salary and bonus.

BOX 857

FOUNDRY CLEVELAND 13, OHIO

MOLDING FOREMAN

Jobbing steel foundry Eastern Penna. Must have experience all types machine molding and sand-slinger and be able to handle men. Excellent opportunity advancement. Salary commensurate with ability. Address: Box 816, FOUNDRY, Cleveland 13, Ohio.

SAND CONTROL

Large mechanized eastern foundry requires experienced sand control man. Experience required on both natural and synthetic sands. Reply state age and experience. Address: 823, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Opening for Foundry Metallurgist in modern steel foundry Eastern Penna. Practical foundry background desirable but not necessary. Excellent opportunity for advancement. Address: Box 814, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Experience in steel jobbing work essential. Must be able to follow production schedules. Supervise production by machines and coreblowers all cores. Modern foundry Eastern Penna. Salary and bonus commensurate with ability. Address: Box 815, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRYMAN

With sales ability and metallurgical or sand practice background to represent foundry supply company in Middlewest. Prefer man about 30 years old. Salary plus bonus. State experience and salary expected. Address: Box 855, FOUNDRY, Cleveland 13, Ohio.

MELTING FOREMAN

Must be experienced all nonferrous metals. Fisher oil furnaces. Write stating experience. Excellent opportunity for the right man.

BRONX BRASS FOUNDRY

2727 Bailey Ave. Bronx, N. Y.

ASSISTANT SUPERINTENDENT

Nonferrous, medium size shop, sand casting and permanent mold. Eastern Michigan. Reputable and well established foundry. State qualifications. Address: Box 854, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Small plant in Midwest running both grey iron and bronze pressure castings has opening for a man who is fully qualified to take complete charge of all foundry operations, including analysis. Salary $10,000 per year. Address: Box 858, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Free lance magnesium and aluminum salesman on high percentage commission basis for modernly equipped foundry with $20,000,000 year capacity. Tremendous opportunity. Address: EASTERN FOUNDRY INC., 2 PACIFIC AVENUE, JERSEY CITY 4, N. J.

EXPERIENCED PATTERNMAKER

To work in, prepare estimates and manage completely equipped shop affiliated with Dallas' largest nonferrous foundry but doing outside work. Right man can eventually share in profits, ownership. Write stating salary required. ADDRESS: WAYLAND BOLES, 4369 POTOMAC, DALLAS 5, TEXAS.

ALLOY STEEL FOUNDRY

Manufacturers of corrosion and heat resistant castings, requires services of foundry foreman or superintendent. To assume complete responsibility for foundry operation. Minimum of ten years' experience in alloy steel required. Interviews by appointment only. Salary open. Address: Box 851, FOUNDRY, Cleveland 13, Ohio.

Representative Wanted

IRON FOUNDRY REPRESENTATIVE

Iron foundry of established high standing located in the east desires the services of an experienced sales representative for New York City and vicinity on a commission basis with a permanent arrangement opportunity. Address: Box 827, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT

Grey iron foundryman, age 48, 25 years' experience producing quality castings. Well versed in cupola, continuous melting, sand control, natural and synthetic, all types molding machines. Cost minded, work from blue prints. Desires connection with reliable firm. Address: Box 872, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 797, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRYMAN

Desires position as superintendent or foreman, gray iron or nonferrous. Practical man with 26 years' jobbing and production experience. Soil pipe and fittings and farms machinery included. Address: Box 785, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

MANAGER—ASSISTANT TO PRESIDENT

Steel, iron, brass. Thoroughly experienced in every shop operation, metallurgy, engineering, accounting and management. Excellent ability to develop a superior organization by leading, teaching and example. Outstanding reputation for keen analysis, sound judgment and a rare combination of practical experience, managerial ability and effective personality. Address: Box 375, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

Experienced in gray iron and some nonferrous on both production or jobbing basis. Exceptional background of practical and technical training. Cost minded and have the best in references. Eighteen years of executive background. Address: Box 707, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Wood metal work including precision cast matchplates and pattern work in aluminum, brass or iron. Have about 40 years in above work and foundry trouble shooting on pattern equipment. Address: Box 843, FOUNDRY, Cleveland 13, Ohio.

PRECISION CASTINGS

Precision casting match plates, core boxes and castings. Can set up shop and run as paying department in plant. Capable patternmaker. Have most equipment to operate shop. Address: Box 841, FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN

Thirty years of experience in all types of castings, brass aluminum and copper. All experience in jobbing work with some production work. Cleveland and vicinity preferred. Address: Box 848, FOUNDRY, Cleveland 13, Ohio.

PRACTICAL—TECHNICAL

Gray iron foundryman, age 48, molder by trade, graduate metallurgist. Outstanding background of experience and ability in highly mechanized high production foundry using most modern equipment and methods. Well versed in slingers, jolts, squeezers, blowers, sand control, continuous pouring, etc. Works from blue prints. Cost minded. Wants connection with sound firm needing services of high grade foundryman to get results. Address: Box 826, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY EXECUTIVE

Can take complete charge of all foundry operations, small, medium or large or act as technical advisor to the chief executive. Education and experience data on request. Now employed. Address: Box 838, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Practical grey iron foundryman desires position as superintendent of a captive foundry. Experience in all phases of foundry activities. Light production to heavy jobbing work. Twenty-five years foundry experience. Address: Box 875, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN OR FOREMAN

Large or small castings in gray iron or nonferrous, green or dry sand. Have been general foreman for 20 years with practical experience in all foundry details. Address: Box 687, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRYMAN

Experienced all around foundryman, iron, brass, aluminum wants to buy or run a foundry. Will work on salary and percentage. Address: Box 850, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Twenty years' experience in core room, 15 years as general foreman. Experienced in all types of cores on blowers, bench, rollover machines in steel and grey iron. Address: Box 878, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Practical, technically trained, qualified by experience in all phases of the foundry. Light and heavy work, green and dry sand. Well versed in cupola and metallurgy, cost minded, pleasant personality. Address: Box 873, FOUND-

AVAILABLE—FOUNDRY MANAGER OR SUPERINTENDENT

Forty-five, experienced in heavy, medium and light work. All around foundryman. Capable producer, salary open. References. Address: Box 866, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Desires position western states. Patternmaker four years, foundry foreman five years. Knows sand conditioning, mechanized foundry. 28 years of age, energetic and well trained. Address: Box 868, FOUNDRY, Cleveland 13, Ohio.

FOREMAN OR SUPERVISOR

Young, journeyman foundryman desires the opportunity to become foreman or supervisor in grey iron or nonferrous jobbing shop, excellent qualifications and best of references. Address: Box 867, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Capable working foreman, both wood and metal and plaster pattern work. Middle age first class mechanic. Estimate work and complete in shop. Can teach apprentice help. Address: Box 842, FOUNDRY, Cleveland 13, Ohio.

GRAY IRON METALLURGIST

At present in France for U. S. Government. Available June 1st. Address: Box 879, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Wide experience in all phases of management to take charge of small foundry, gray iron, brass, large or small castings, jobbing or production. Well versed in scrap control. Salary or salary and profit plan. Address: Box 839, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

29" Used magnet furnished with 3 KW generator or

39" Used magnet furnished with 5 KW generator, complete with controller and cable reel, suitable for either size for 230 D.C. output.

Advise price and where above equipment is located for inspection.

FREDERICK IRON & STEEL, INC.

FREDERICK, MARYLAND

PHONE 1400

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY

765 PENOBSCOT BLDG. DETROIT 26, MICH.

WOODWARD 1-1894

Wanted-To-Buy

WANTED

Electric Gyratory Laboratory sand sifter with 20-40-70-100 140-700 mesh 8" screens and pan. State price and motor voltage. Combs or equivalent. Address: PAUL M. WIENER FOUNDRY CO., MUSKEGON, MICHIGAN.

WANTED TO BUY

Pottstown Tapping Machines.
2—16" Cyl. Jolt Squeeze Stripper Molding Machines
1—14" Cyl. Rollover Molding Machine
STEEL FLASK EQUIPMENT
18—14 x 16 6" Drag 4" Cope
18—12 x 18 6" Drag 4" Cope
24—12 x 23 6" Drag 4" Cope
18—14 x 20 7" Drag 7" Cope
12—16 x 16 6" Drag 6" Cope
12—18 x 18 6" Drag 9" Cope
24—18 x 18 6" Drag 6" Cope
24—24 x 24 7" Drag 7" Cope
18—16 x 26 6" Drag 6" Cope
12—30 x 30 5" Drag 7" Cope

NATIONAL FOUNDRY COMPANY OF NEW YORK, INC.
2-56 SANDFORD ST. BROOKLYN 5, NEW YORK

WANTED

Need for production—Simpson Mixer, Raymond Mill, one or two vibrating screens. Please give full particulars. P. O. BOX 1351 CHURCH STATION, NEW YORK 8, N. Y.

WANTED TO BUY

Used heavy duty mold car conveyor, approximately 60 cars. Address: Box 856, FOUNDRY, Cleveland 13, Ohio.

WANTED

One—#3 Simpson intensive sand mixer and loader. Must be recent model in good condition. Address: Box 849, FOUNDRY, Cleveland 13, Ohio.

WANTED

SANDSLINGER WANTED—Junior Tractor. Address Box 656, FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

U. S. Rotary melting furnaces, 500 lb. to 5000 lb. Must be in good operating condition. Address: AMERICAN COMPRESSED STEEL CORP., 900 E. FRONT ST., CINCINNATI, OHIO.

WANTED

Used foundry laboratory equipment and sand testing equipment. Give prices, description, etc. Address: Box 870, FOUNDRY, Cleveland 13, Ohio.

Available Capacity

AVAILABLE CAPACITY

Pattern shop complete service, prompt delivery on first class work. Location, Michigan. Some open capacity. Address: Box 840, FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS

$3,500 to $35,000. We offer the original personal employment service (established 42 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. Address: R. W. BIXBY, INC., 101 DUN BUILDING, BUFFALO 2, NEW YORK.

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

CLASSIFIED ADVERTISING

Employment Service

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in Steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions.

WRITE or CALL for registration.

Completely Confidential

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

Accounts Wanted

ESTABLISHED CASTINGS REPRESENTATIVE

Graduate engineer, desires to represent foundry producing heavy iron castings and one producing light and heavy steel castings. Territory covered —Eastern Pennsylvania, New Jersey, Delaware and Maryland. Excellent industrial contacts in area undergoing important expansion. Suburban Philadelphia office. Address: Box 865, FOUNDRY, Cleveland 13, Ohio.

ACCOUNTS WANTED

Manufacturers' agent covering Michigan and Northern Ohio with complete knowledge of foundries including contacts with Detroit area automotives, desires additional account to represent in this area. Will provide excellent engineering and promotional ability for major line. Address: Box 862, FOUNDRY, Cleveland 13, Ohio.

ACCOUNTS WANTED

Foundry Supply Company active in Michigan, Ohio and Indiana desires additional accounts wanting intensive sales effort in this area. Can warehouse in Detroit area and outside. Equipment and supplies can be handled. Excellent representation and contacts for your products. Address: Box 861, FOUNDRY, Cleveland 13, Ohio.

MANUFACTURERS AGENT

Offices in Birmingham, Alabama, calling on foundries, steel plants and manufacturers in the South and Southeast desires additional line. If interested in high class representation in this fast growing section this is an opportunity to make a desirable connection. We are metallurgical and foundry engineers and have successfully worked the territory for 20 years. Address: Box 864, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY FOR SALE

Well equipped foundry. Main building about 150 x 150. 36" cupola. Prompt possession. Priced right. Terms can be arranged. Located in Sanford, North Carolina. Write for further information to:

BOX 628

SANFORD NORTH CAROLINA

FOUNDRY—GRAY IRON

Located southern Ill. town. Pop. over 10,000. Water and railroad transportation available. Labor plentiful. Foundry with 2 clear spaces 80x320, with overhead monorail. Has 2 No. 7 Whiting cupolas 72" in diameter. Contains equip. ideal for mechanized oper. Address: Box 358, FOUNDRY, Cleveland 13, Ohio.

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

Foundries For Sale

FOUNDRY FOR SALE

MIDWESTERN LOCATION—NEAR CHICAGO

Buildings in excellent condition, consisting of approximately 50,000 square feet. Sufficient acreage for expansion. Plant fully equipped and operating efficiently and successfully. Inventory position satisfactory. Pattern shop, railroad siding, etc. No agents.

BOX 876

FOUNDRY CLEVELAND 13, OHIO

For Sale

FOR SALE

Sand-Blo delux model core blower, model C-D 40-D. Used very little and in excellent condition.

THE PROOF CO.
936 EAST 72ND ST. CLEVELAND 3, OHIO

FOR SALE

Complete melting installation consisting of:
2—8 ton Brackelsberg Rotary furnaces
1—10 ton cradle type holding furnace together with burners, pulverizer, spare furnace shells, exhausters and stacks.

NATIONAL MALLEABLE & STEEL CASTINGS CO.

10590 QUINCY AVE. CLEVELAND 6, OHIO

SAND CUTTER—FOR SALE

AMERICAN WHEELABRATOR #79-60"
MODEL "M"

Electric powered—220 volt, 60 cycle, 3 phase safety type head—complete ready to operate, with motors, cable and reel.
Up to date model. Good as new. Contact

NEENAH FOUNDRY COMPANY
NEENAH, WISCONSIN

ELECTRIC FURNACE

Direct Arc., Sam Arnold, 1 ton, complete with spare parts, 1000 K.V.A. transformer, automatic control panel and generator set. All buss bar, cable, disconnects, etc. Excellent operating condition.

DAR HOWELL-MANNING, INC.
315 WEST NINTH STREET
LOS ANGELES 15, CALIFORNIA
ROOM 804

FOR SALE

Pangborn blast cleaning machine, serial 6LE-413, reasonable price. For particulars, write: TUTHILL SPRING COMPANY, 760 WEST POLK STREET, CHICAGO 7, ILLINOIS.

For Sale

FOR SALE

1—5' x 8' Simplicity shake out, D28 A.
1—Type "AA" American Sand Cutter, 6' between wheels, 15 hp Westinghouse motor, 220/440 volt, 3 phase, 60 cycle, 1735 rpm, good condition.
1—Johnston & Jennings, jolt squeeze pattern draw molding machine, Model #2, new, never used.
1—Tabor yoke type jolt squeeze pattern draw for flasks to 36".
1—Beardsley & Piper swingslinger with 5 ton plate feeder for operation with 3 phase, 60 cycle, 220 volts, practically new.
Several Demmler large core blowing machines.

NATIONAL FOUNDRY CO. OF N. Y., INC.
10 SANDFORD STREET
BROOKLYN 5, N. Y.

FOR SALE

(2) Carl Mayer Vertical Core Ovens—42'. Used six months Each $10,000.00
#918 Johnston & Jennings Jolt, Rollover & Pattern Draw molding machine; table size 44" x 54"; no pit necessary 1,500.00
Herman Hi Speed Rollover & Pattern Draw Molding machine; 1500 lb. series; table size 36" x 48" 1,500.00
(2) REJ International jolt, squeeze, rollover, and draw molding machines; 800 lb. capacity; used very little 1,100.00
#91 Osborn Core Blower, with clamps. 650.00
Beardsley & Piper Turntable—16'—with 6 Champion Push off machines 3,500.00
or will sell separately
The following machines are priced at only $250.00 each:
(3) Int'l. PKL 12" Jolt Squeeze Pin Lifts
#403 Osborn Jolt Rollover—42" swinging table
SPO Model 914 Jolt Rollover Squeeze
Champion CD-3 Core Blower—Floor Model
(2) #1 J & J Jolt Squeeze Strippers
Int'l. 24 x 10 Jolt Rollover
Pridmore Rollover—33" x 24" table
1—Clearfield sand mixer, model 610, new in 1948 ..... $2,500.00

BALCHER MACHINERY COMPANY

1884 S. Compton Rd. Cleveland Heights 18, O.
FAirmount 1-1186

FOR SALE
MOLDING MACHINES

Two (2) NICHOLLS TYPE 24S-20 HEAVY DUTY SQUEEZER MOLDING MACHINES, practically new. Equipped for complete automatic operation, including Flask Indexing, Automatic Sand Hopper, Strikeoff, Squeeze, Draw and Roll Off Device.
All necessary air cylinders, valves, and electrical controls for above equipment.
Machines will handle flask sizes up to 18" x 30" x 5" cope x 5" drag, with a molding cycle of 15 seconds.

BOX 819

FOUNDRY CLEVELAND 13, OHIO

FOR SALE

SPO jolt squeezers portable cantilever type table 20" x 17" cylinder 10" with master vibrator knee action. Price $255.
Riddle 1/3 HP Universal free wheeling. Price $90.
Pangborn 6' rotary direct pressure table with 4 nozzles, generator, elevator, abrasive separator, reclaimer, table designed to clean shells, wheelpeening, shot cleaning or flat work. Price $1000.
Pangborn suction cabinet 48" x 30". Price $150.
Pangborn sandblasting room size 7'6" x 5' with abrasive separator, elevator conveyor, 5 HP blower dust collector, front door or overhead loading. Price $1100.
Westinghouse air compressor 25 HP 2 cylinder vertical water cooled direct connected mounted on channels 850 rpm, 150 cubic feet of free air, 110 lbs. with unloader air receiver. Price $1000.

M. EISTEIN

141 MANGIN ST. NEW YORK 2, NEW YORK

For Sale

FOR SALE

MOLDING MACHINES
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
1—International 14 x 8 jolt rollover draw.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
BLOWERS FOR CUPOLAS AND FURNACES
10—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#59 Connersville-Acme.
1—Connersville rotary 24 cu. ft. per rev. 6200 C.F.M.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
METAL MELTING EQUIPMENT
5—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn style GJ-1 rotoblast barrel complete with Pangborn style FM automatic loader. Load capacity approx. 16 cu ft.
1—Pangborn Sand Blast Unit, including generator tank, shot cleaner, bucket elevator. Suitable for use with room.
MISCELLANEOUS
1—Sullivan WJ-3 2-stage air compressor, 500 cu. ft., 100# pressure.
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—NB-2 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
4—Heavy Duty Flexible Shaft Grinders 2 HP.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

Whiting square tumbling mill 30" x 30" x 60". Thickness of plate ¾"; v belt pulley drive; brass bearings. Excellent for medium size castings. Price $300 f.o.b. St. Jerome. Apply: ST. JEROME INDUSTRIES LTD., CASTONGUAY ST. WEST, TEL: 3767, ST. JEROME (TERREBONNE) QUE., CANADA.

FOR SALE

SPO #9336 jolt squeeze rollover molding machine and SPO #2134 stationary jolt squeeze cope molding machine, up to 28" pattern. Used little.

THE PROOF COMPANY
936 E. 72nd ST. CLEVELAND 3, OHIO

FOR SALE

Tabor 22" x 42" shockless jolt, rollover molding machine with wheels and air clamps. Purchased August, 1950—used one week—clamps never uncrated. A real buy. If interested, write: P. O. BOX 256, WATERVILLE, MAINE.

FOR SALE

Herman heavy duty jarring molding machine. Ser. #4500, 48" x 54" table, 13" solid cylinder. Independent strippers, 10" cylinders with 12" draw, ser. 4501. Price $3,000.00. Address: THE CHRIS. ERHART FOUNDRY & MACHINE CO., 1237 W. SIXTH STREET, CINCINNATI 3, OHIO.

FOR SALE

1—No. 167 Milwaukee, squeeze rollover draw molding machine max. flask cap. 33 x 32—12" draw, 16" squeeze cylinder—34" total daylight, automatic clamps purchased new 1944. Used only 17 months. Machine in good operating condition. Priced below ceiling. Address: G. H. R. FOUNDRY, DAYTON 1, OHIO.

RECONDITIONED FOUNDRY EQUIPMENT
Largest stock in the East.
Only 120 miles from Atlantic City.
Three Warehouses. Visit us and save money.
Send for five page listing, or call us.
UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD STREET
SHILLINGTON, PA.
PHONE—READING 30311—40146
R. B. HARRISON, MGR. FOUNDRY DIV.

FOR SALE

Standard Neway "Hardy Sandy" model HS-4GT complete. Neway "Reddi Sandy" with stationary grate and hopper watering device, aerator. Only in use for five months. Reasonable price. Address: Box 871, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Hines aluminum pop-off flasks, numerous sizes including jackets. Will furnish sizes upon request. All flasks in good condition priced reasonable. Any one interested contact: PURCHASING DEPARTMENT, RICHMOND RADIATOR CO., NEW CASTLE, DELAWARE.

FURNACES FOR SALE

Seven used heat treating furnaces, good condition. Suitable for heat treating armor castings and 7-ton gantry crane. Available for immediate delivery. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

EQUIPMENT FOR SALE

Spencer multi-stage turbo compressor, catalog #1220, 2300 c.f.m. at 20 ounces per square inch pressure. Complete with Spencer outlet adjusting valve. Motor 20 H.P., 1750 R.P.M., 3 phase 60 cycle 220-440 volts. Serial #39470. Address: Box 834, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

USED HOUGH PAYLOADERS HA MODELS WITH HARD RUBBER OR AIR TIRES IN FIRST CLASS MECHANICAL SHAPE. PRICED RIGHT. ADDRESS: CONSTRUCTION EQUIPMENT CORP., 2118 S. 7th ST., ST. LOUIS 4, MO., PHO: SIDNEY 1070.

FOR SALE

1—International type PK Jolt Squeeze Pin Lift 18" cylinder, 8" lift
1—International Plain Jolt—18" x 24" Table
1—Champion Core Roll-over, 16" x 8", Portable
1—1-ton Gear Ladle
1—3 HP Stand Grinder
1—2-ton Lo-Hed Hoist, 220 V., D.C.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

Hough Model HA payloader—completely overhauled recently, four tires in good condition. Standard bucket. Price $2,000. Address: NORTH SHORE FOUNDRY COMPANY, WAUKEGAN, ILLINOIS. PHONE ONTARIO 6672.

FOR SALE

3—Tilting Swing Head cover brass furnaces, No. 300 crucible.
1—Pedestal Grinder with 5 HP. Motor.
1—Covered Worm Geared Ladle, 1000 lb. cap., made by Modern Equip. Co.
1—Whiting Slag Ladle
1—Worm Geared Covered Ladle, 400 to 600 lb. for Pouring Device.
1—10 Ton Whiting Worm Gear Ladle
2—1000 lb. Worm Gear Ladles
2—2 Ton Worm Gear Ladles.
1—6 Ton Worm Gear Ladle
1—7 Ton Worm Gear Ladle
1—Blystone Sand Mixer complete with motor, gear driven.
1—JFL International Power Jolt Foot Lift Machine.
1—JDP. International Jolt Stripper, 600 x 8
2—International "G" Machines 20 x 8
1—Osborn Bumper 24 x 36
1—International Jolt Squeezer
2—24" Elec. Riddles.
2—Gyratory Elec. Riddles.
1—American Sand Cutter Machine Size 89/70 M.
1—Sprue Cutter with 2HP. Motor.
1—36 x 54 Late Model Whiting Tumbling Barrel complete with Jones Speed Reducer & 7½ HP. Motor.
1—Jeffrey Sand Conditioner.
1—Royer Sand Conditioner.
1—Wells Metal Band Saw Type 9M42.
1—General Blower, 3 HP. Motor, 16 oz. pressure, 220 or 440, 3 phase, 60 cycle, 375 CFM.
83 Set-Truscon Pressed Steel Flasks, 15 x 20, 8 Cope, 3 Drag.
1—#42 Osborn core rollover machine.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

Herman—6000# series JOLT-STRIP MACHINE 48 x 54 table, 12" draw. Late.
Osborn—JOLT STRIPPER, Model 405, 21 x 53.
Osborn—JOLT ROLL OVER, Model 406, 36 x 24.
Osborn—JOLT STRIPPER, Model 406, 36 x 52.
Cupolas—modern #9 Whiting #8.
R-C POSITIVE BLOWER 12 x 20, 20 hp.
R-C POSITIVE BLOWER 22 x 66, 75 hp.
MIXING LADLES, 1000# cap. to 4000#.
V.C.G.-3 SUPER GYROSET SHAKE OUT, 6' x 8' deck, complete.
PKL 12 Int. JOLT SQUEEZE PIN LIFT MACHINE. Portable.
Am. SAND CUTTER, Model AA, #1111, 15 hp, 220/440 v.
Int'l. CORE BLOWER, type SB11 $750.00.
(2) CAR SPOTTERS, 5 hp, $250.00 ea.
(2) Webster & Perkins PEDESTAL GRINDERS, 1200 rpm.
Everett STAND PEDESTAL GRINDER.
Gardner GRINDER, 52" horizontal, 20 hp. Practically new.
15 H.P. GRINDER.
SNAG GRINDERS to 10 H.P.
AIR COMPRESSOR, Sullivan 11 x 10, 50 HP, AC motor & starter, $750.00 f.o.b.
MAGNETIC SEPARATOR—Ding's Mfg. 12" x 18", 110 V., S. Ph. motor, 2 hp., ser. R 5771. $600.00 f.o.b.
FANS & BLOWERS—up to 125,000 cfm.
ELECTRIC FEED RAILS & TROLLEYS.
HOISTS, Electric, hand, air 1 to 10 ton.
CONVEYORS—all sizes and types.
CRANES—overhead & jib, all sizes.
MOTORS, SPEED REDUCERS, BLOWERS — any size.
AIR COMPRESSORS—from 1 hp up.
FOUNDRY EQUIPMENT. Send us your inquiries.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, OHIO

FOR SALE

No. 4 U. S. rotary melting furnace complete. Ser. No. 232 capacity 2000 lbs. brass. Practically new. Adaptable for oil or gas firing.

BURNDY ENGINEERING CO., INC.
11511 BELLINGER ST. LYNWOOD, CALIF.

FOR SALE

One (1) Model AG 30" x 30" heavy duty sandblast cleaning cabinet including vacuum-type dust filter, exhaust fan, magnetic starter and 12" barrel with motor. Like new—never used. Address: Box 824, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

2—Ajax-Tama-Wyatt electric induction furnaces —tilting type for melting aluminum, rated 60 KW. Completely equipped for immediate production. Write or phone for details. PHONE 2-8945 F. L. PHILLIPS CO., INC., 80-82 FREDERICK STREET, BINGHAMTON, N. Y.

FOR SALE

American Wheelabrator tumblast, 27" x 36" complete with electrical equipment for 220 volt 60 cycle 3 phase current. Good condition. $3500.00 F.O.B. Tulsa. Address: EMPIRE PATTERN AND FOUNDRY CO., BOX 1647, TULSA, OKLAHOMA.

FOR SALE

3—United Electric Double End Snag Grinders, 7½ H.P., Variable Speeds, Model 64, in excellent condition.

1—Core Blower, Demmler Model 3 E. Reasonable. Serial 1457.

1—Fairbanks-Morse Scale, 6,000 lb. cap., Springless, Platform Type.

1—American Vertical Broach, 6 ton capacity, 36 inch stroke, Hydraulic. Serial No. 2844. Model VTL. 1940 new. Like New.

1—Yale Electric Platform Lift Truck, 6,000 lbs capacity, Edison Battery. Clean.

AAA SALVAGE CO.
856 EDDY RD. CLEVELAND 8, OHIO

FOR SALE

1—Osborn core blower, model 98 with air clamps reconditioned. Address: Box 852, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
4000	32 oz.	Spencer	60	440/3/60	
3500	40 oz.	Spencer	60	440	1800
2700	16 oz.	Spencer	20	220/3/60	1750
650	16 oz.	Spencer	10	220/3/60	3600
450	40 oz.	Spencer	7½	220	1750
400	16 oz.	Spencer	3	220/3/60	3500
PRESSURE BLOWERS (3 Phase, 60 Cycle)					
100	7" SP	Spencer	1	110/DC	3500
9100	7" SP	Sturtevant			1900
4500	16 oz.	G. E.	30	440	3600
2700	16 oz.	Nth. Amer.	20	220/440	3600
2500	7 oz.	Sturtevant	15	220/440	1800
1150	20 oz.	North Amer.	10	220/440	3160
400	43 oz.	Spencer	2	220/3/60	3500
800	8 oz.	Nth. Amer.	3	220	3600
660	20 oz.	AllenBillmyre	7½	440	3600
450	6 lb.	A&B	30	220/440	3450
340	20 oz.	AllenBillmyre	3	440	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE

1—Lindberg-Fisher electric induction stationary holding and melting furnace, type IM-R401S, for aluminum available for immediate delivery. Furnace rated at 40KW, 440 volts, single phase, 60 cycles. Complete with control panels, pyrometer with lead wire, thermocouple, fused panel, meter, contactor, capacitors, cleaning tools and 440 volt, 3 phase, 60 cycle blower. Like new—never uncrated. Will sell at our cost $3896.82, f.o.b. Springfield, Mass. Address: CARLSON PATTERN SHOP, INC., 616 BERKSHIRE AVENUE, SPRINGFIELD 9, MASS.

FOR SALE

One Osborn 405-77 jolt rollover and pattern draw machine, 3000 lb. capacity, for 64 x 57 flask. 13" to 23" draw with leveling and runout car. Price $3500.00. Address: ECLIPSE-PIONEER FOUNDRY, DIVISION BENDIX AVIATION CORP., TETERBORO, NEW JERSEY.

FOR SALE

30 Sets Flasks, 17" x 19", 4½" Cope and Drag, 22½" Pin Centers. Bars in Cope and Drag.
50 Sets Round Flasks, 15" Dia., 4" Cope and Drag, 18" Pin Centers. Bars in Drag.
100 Sets 18" Round Flasks, 4½" Cope with Bars, 5¾" Drag with Bars, 24¼" Pin Centers.
20 Sets 22" Round Flasks, 6" Cope and Drag, Bars in Drag, 25" Pin Centers.

CHESANING PIPE CO.
CHESANING, MICHIGAN

FOR SALE

We have 5—2 ton
1—5 ton
Ingersoll-Rand Air Hoist. Like new. No reasonable offer refused.

EASTERN STATES STEEL PRODUCTS CORP.

EAST BRIDGEWATER, MASSACHUSETTS

SURPLUS

STAND GRINDER AND WHEELS OFFERED AT ½ PRICE OF WHEELS ALONE!

Double end stand grinder with 5 H.P. motor (perfect operating condition)

75—14 x 2 x 1¼" Baystate wheels for alum.

20—16 x 2 x 1½" Baystate wheels for iron.

BLACKHAWK FOUNDRY & MACHINE CO.

#323 SO. CLARK STREET

DAVENPORT, IOWA

FOR SALE

Two overhead Sheppard Cranes 3 ton capacity—25' span. Address: REDSTONE INDUSTRIES, INC., 518 SECOND NATIONAL BANK BLDG., UNIONTOWN, PA., PHONE 8-3527.

For Sale

PRICED FOR QUICK SALE

40,000 POUNDS

CORE PINS

100 lb. per wooden crane

3¾ x 18 gauge headless and pointless

4¾ x 18 Double pointed

Direct all inquiries to

ARNOLD LANDESBERG

LURIA BROTHERS & COMPANY, INC.

INDUSTRIAL EQUIPMENT DIV.

LINCOLN LIBERTY BUILDING

PHILADELPHIA 7, PA.

PHONE RITTENHOUSE 6-7455

JOB-PRODUCTION ALLOY FOUNDRY

Having trouble with delivery of new equipment? Here is a modern installation only seven years old and well maintained that is suitable for job or production castings of about 100,000 pounds per month. Included is a Beardsley & Piper #S-490 sandslinger, a #610 Clearfield sand mixer, Schneible roto-clone dust collector, magnetic belt, breaker barrel, elevators, sand bins, roller conveyor, flasks, clamps, etc. All this can be had at a fraction of its 1946 cost. We would prefer to have you remove it as a whole, but all reasonable offers for individual units will be considered. For complete list of items and prices:

BOX 830

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY EQUIPMENT FOR SALE

Champion Core Blowers CB 12 Serial No. 6736
Champion Core Blowers CB 15 Serial No. 6738
Champion Core Blowers CB 400 Serial No. 6744
The above core blowers were purchased new in 1945 and have not been in use. They are a good buy for a party who needs core blowers.

We have four elevators for sale as follows:

Elevator D 29' Chain 58⅝' Dual Chain
Elevator F 43' Chain 86' Dual Chain
Elevator S 40' Chain 84' Dual Chain
Elevator R 47' Chain 95' Dual Chain

There are four speed reductors as follows:

(3) Horsburgh & Scott Worm Gear Speed Reducers Series WB2400, Class I, Ratio 45:1 17 HP Input, Speed 1750 R.P.M. Two, Serial C1563 and One, Serial C1648

(1) Horsburgh & Scott Worm Gear Speed Reducer Series WB2000, Class I, Ratio 45:1 11.5 HP Input, Speed 1750 R.P.M. Serial No. C640

These elevator casings are 4'-6" x 2'-6", the elevator buckets are 8" x 19" x 7" deep, Farrell No. 85, Mounted on chain with $3\frac{1}{16}$" pitch.

FRANK FOUNDRIES CORP.

MUNCIE, IND.

FLASKS

Sterling Wheelbarrow Rolled Steel Flasks
18 sets 46 x 50—6" cope, 6" drag
17 sets 38 x 44—6" cope, 6" drag
20 sets 32 x 48—6" cope, 6" drag
18 sets 32 x 48—6" cope, 8" drag
also 21 sets 62 x 41 x 31 Magnesium, 5" cope, 9" drag
2 sets 48 x 32 Magnesium, 5" cope, 5" drag
1 set 28 x 22 Magnesium, 5" cope, 4" drag

CONVEYOR

ALL SIZES AND TYPES

ALLIED MATERIALS HANDLING CO.

4657 SPRING GROVE CINCINNATI 32, OHIO

For Sale

FOR SALE

FOUNDRY EQUIPMENT

1—No. 55 M Pangborn Car Type Blast
1—Beardsley Hydraulic Speed Slinger
1—10' dia. Storage Bin and Plate Feeder
1—#24 Davenport Jolt Rollover 38x24 table
1—#413 Osborn Jolt & Pattern draw
2—Robinson Double Core Rollover Machines
1—Robinson Core Stripper
1—Osborn Core Blower
1—Nicholls Jolt & Power Squeeze
9—Milwaukee No. 163 Jolt Squeeze & Stripper
1—48" Niles Vertical Car Wheel Lathe
1—48" Niles Vertical Cut Off Machine
1—48" Niles Vertical Wheel Boring Lathe
1—Lot New & Used Buildings
1—Lot Cranes, Hoists, Trolleys
1—Lot Lift Trucks
1—Lot Horizontal Fire Tube Boilers

HETZ CONSTRUCTORS INC.

P.O. BOX 671 **WARREN, OHIO**

Phone & W. U. NILES OHIO 2-2509

FOR SALE

2—Osborn Squeezers. Model #75-J.
1—U. S. Electric Tool Co. Double End Grinder. 42" between wheels, 3 h.p., 220v-3ph-60c.
1—Band Saw. 24" with ¾ h.p. motor, 220v-3ph-60c.
1—Walker-York Coke Fired Crucible Furnace Blower. 110v-1ph-60c.
1—Royer Sand Mixer. Model 1936, 220v-3ph-60c.
1—Ingersoll-Rand Air Compressor. 6" Bore, 4" Stroke, 64 C.F.M. Displacement, 7½ h.p.-3ph-60c. Type ES-1.

BOX 869

FOUNDRY **CLEVELAND 13, OHIO**

FOR SALE

2 Milwaukee Jolt Pin Lift Machines, Model 15362 B, 12" lift serial No. 11826, 11827, new in 1942 used less than 6 months, condition like new. Price $750.00 each.
Tabor and Osborn Jolt Squeezers.
3 Simplicity 4 ft x 6 ft Shakeouts.
#205 Besley Double End Disc Grinder.
Bench and Floor Type Grinders, Buffers, Air Tools, Chain Hoists, Sly Blast Barrel, complete with Dust Collector, U. S. Electrical Tool 20" and 24" Swing Grinders.
Monarch Tilting and Holding Furnaces.
Sly Dust Collector, complete with 50 H.P. Rotoclone.

GEORGE W. CASSADY COMPANY

P. O. BOX 238,

WILLIAMSPORT, PENNSYLVANIA

WHEELABRATOR FOR SALE

One only 36" American continuous Tumblast Wheelabrator, type S19-12, complete with loading conveyor. Like new, used only three months. Ideal for cleaning castings, fittings, etc. Make collect call to: PAUL HERTEL, LACLEDE 2100, ST. LOUIS.

VALLEY STEEL PRODUCTS CO.

124 SIDNEY ST. **ST. LOUIS 4, MO.**

FOR SALE

2—24″ x 30′ Belt Conveyors, 5 H.P. 220/440V. 3ph. 60cy.

1—#405-79 Osborn Rollover and Pattern Draw Molding Machine.

1—#405 Osborn Rollover and Pattern Draw Molding Machine.

1—#147 Osborn Rockover and Draw Machine, for long jobs.

1—Herman Rollover Molding Machine, 22″ cyl. 42″ x 72″ table.

1—Herman Bumper, ser. #1458, 7000# jolt cap., 40″ x 58″ table.

1—Herman Rollover floor type 20″ x 42″, 750# jolt cap.

1—Herman Jarring Stripper Molding Machine, 40″ x 72″ table, 20″ draw.

3—Model 2166 SPO Jolt Squeeze Pin Lift Molding Machines.

1—#1 Demmler Core Blower—New.

1—Redford Core Blower New, on stand.

1—Hough Payloader, Model HA.

1—Simplicity Shakeout (Core Knock-out) 4′ x 8′.

1—Kane & Roach Wire Straightener, 3/16″ to ½″ wire, 7½ H.P., 440V. 3ph. 60cy.

1—Climax #2½ Wire Straightener, 3/16″ to ½″ wire, 3 H.P., 220/440V. 3ph. 60cy.

1—Pangborn 28 cu ft. Rotoblast, Type CK with power loader.

1—Pangborn 12 ft. dia. Tableblast complete with dust collector.

1—Dust Collector, Parsons #118 complete with 20 H.P. motor & blower.

4—Tumbling Mills, 30″ x 60″ with 15 H.P. motor 220/440V. 3ph. 60cy.

1—10 H.P. Black & Decker double stand grinder, 440V. 3ph. 60cy.

1—3 H.P. double stand grinder, belt driven.

1—40 H.P. Pennsylvania Air Compressor.

1—#5 Cupola.

2—3 H.P. Blowers for furnaces.

1—5 H.P. Blower for Furnace.

2—Micromax Instruments Leeds & Northrup Temperature Control.

2—"Late Type" Model 2047 Osborn Jolt Rollover Molding Machines for cylinder head core production.

1—#3 Simpson muller, 3000# batch size, 8 ft. dia. A-1 condition.

Various sizes of used Steel Flasks.

Various sizes of Hines Popoff Flasks and Jackets.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

15019 Saranac Rd., Cleveland 10, Ohio **Telephone—Glenville 1-1538**

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ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $5.00. Additional words 15c each.

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Any advertisement set in all capital letters, add 50% to the above rates.

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4 inches	50.00	46.00	41.50	37.50
5 inches	60.00	55.00	50.00	45.00
6 inches	73.50	66.50	60.00	53.50
7 inches	82.50	75.00	67.50	60.00
8 inches	91.50	83.50	75.00	66.50
1 column	110.00	100.00	90.00	80.00
Half Page	162.50	150.00	137.50	125.00
Full Page	275.00	250.00	225.00	200.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

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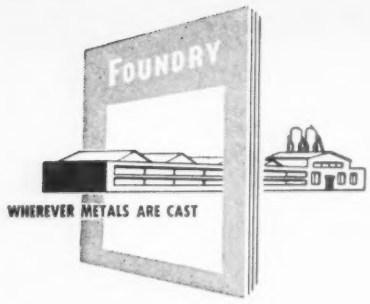
Penton Building, Cleveland 13, Ohio



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NEW EQUIPMENT DIGEST

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ADVERTISING

A

Acheson Colloids Co. 293
Acme Foundry Co. 371
Adams Co., The 26, 27
Air Reduction 99
Ajax Electric Co., Inc. 259, 285
Ajax Electric Furnace Corp. 259, 285
Ajax Electro Metallurgical Corp. 259, 285
Ajax Electrothermic Corp. 257, 259, 285
Ajax Engineering Corp. 259, 285
Ajax Flexible Coupling Co., Inc. 46
Allied Chemical & Dye Corp., The Barrett Div. 8
Allied Chemical & Dye Corp., Semet-Solvay Div. 273
Allied Chemical & Dye Corp., Solvay Sales Div. 220
Allis-Chalmers 9, 39
Alloy Metal Abrasive Co. 375
Alter Co. 76
Aluminum Co. of America 357
American Air Filter Co., Inc. 230, 231
American Bridge Div., U. S. Steel Co. 379
American Clay Forming Co. 287
American Gum Products Co. 374
American MonoRail Co., The 252
American Optical Co. 66, 411
American Refractories & Crucible Corp. 340
American Silica Sand Co. 255
American Smelting & Refining Co. 370
American Smelting & Refining Co., Federated Metals Div. 319
American Wheelabrator & Equipment Corp. 45, 62, 63, 355
Anderson Pattern Inc. 358
Arcair Co. 286
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5
Asbury Graphite Mill, Inc., The 387
Automatic Foundry Equipment Div., W. G. Reichert Engineering Co. 356
Ayers Mineral Co., The 362

B

Babcock & Wilcox Co., The, Refractories Div. 301
Bakelite Co., A Div. of Union Carbide & Carbon Corp. 18
Baker Perkins, Inc. 49
Baldor Electric Co. 23
Baroid Sales Div., National Lead Co. 312
Barrett Div., The, Allied Chemical & Dye Corp. 8
Bartlett, C. O., & Snow Co., The Back Cover
Bassichis Co., The 386
Bay State Abrasive Products Co. 175
Bay State Crucible Co. 384
Beardsley & Piper Div. of Pettibone Mulliken Corp. 232, 233
Beck, P. C., Co. 362
Bedford Tool & Forge Co. 308
Bell, M. A. Co. 361
Belmont Smelting & Refining Works, Inc. 380
Beryllium Corp., The 246
Besly-Welles Corp. 65
Birmingham Committee of 100 280
Black, Sivalls & Bryson, Inc. 69
Boston Woven Hose & Rubber Co. 78
Brummeler Steel Products Corp. 385
Budnick Mfg. Co. 387
Buffalo Forge Co. 335
Buffalo Pattern Works, Inc. 181

C

Campbell-Hausfeld Co., The 118
Cannon Vibrator Co. 381
Carborundum Co., The 308, 324, 325
Carl-Mayer Corp., The 31
Carman, Edwin S., Inc. 374
Carrier Conveyor Corp. 203
Cast-Master, Inc. 383
Central Pattern Co. 349
Centrifugal Casting Machine Co. 378
Chicago Manufacturing & Distributing Co. 44
Chicago Pneumatic Tool Co. 82
Chicago Wheel & Manufacturing Co. 266
Christiansen Corp. 107
City Pattern Foundry & Machine Co. 317
Clark Equipment Co., Industrial Truck Div. 359
Clark Cast Steel Cement Co., The 382
Clayton-Sherman Abrasives Co. 92
Clearfield Machine Co. 241
Cleco Div. of the Reed Roller Bit Co. 185
Cleveland Chaplet & Manufacturing Co. 371
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 68
Cleveland Flux Co., The 74, 75
Cleveland Metal Abrasive Co., The 196
Cleveland Quarries Co., The 272
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 68
Cleveland Vibrator Co., The 352
Coles Cranes, Inc. 237
Combined Supply & Equipment Co., Inc. 379
Construction Machinery Co's 370
Corn Products Refining Co. 20
Crane Co. 60
Crescent Brass & Pin Co. 342
Crobaugh, Frank L., Co., The 387
Crucible Manufacturers Association 11
Curtis Pneumatic Machinery Div. of Curtis Manufacturing Co. 41

D

Davenport Machine & Foundry Co. 83
Dayton Pneumatic Tool Co. 375
DeBardeleben Coal Corp. 374
Debevoise-Anderson Co. 382
Delta Oil Products Co. 72, 73
Demmler, Wm., & Bros. 282, 283, 376
Denver Equipment Co. 253
Desmond-Stephan Manufacturing Co., The 352
Despatch Oven Co. 67
Detroit Electric Furnace Div., Kuhlman Electric Co. 86, 87
Detroit Sheet Metal Works 303
Dings Magnetic Separator Co. 77
Dow Corning Corp. 323
Dresser Industries, Inc., Roots-Connersville Blower Corp. 315
Durez Plastics & Chemicals, Inc. 47

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 205
Eastman Kodak Co., X-Ray Div. 229
Eclipse Fuel Engineering Co. 328
Electric Equipment Co. 385
Electric Furnace Co., The 292
Electro Metallurgical Co. A Div. of Union Carbide & Carbon Corp. 54, 55
Electro Refractories & Abrasives Corp. 318

F

Fabreeka Products Co., Inc. 102
Fairbanks, Morse & Co. 329
Fanner Manufacturing Co., The 281
Farquhar, A. B., Co. 364
Federal Foundry Supply Co., The 2, 84, 85
Federated Metals Div., American Smelting & Refining Co. 319
Foundry Equipment Co., The 24, 25
Foundry Equipment & Supply Co. 363
Foundry Equipment Manufacturers Ass'n. Inc. 367
Foundry Rubber, Inc. 214
Foundry Services, Inc. 116
Foundry Supplies Manufacturing Co. 98
Foxboro Co., The 114, 115
Fremont Flask Co., The 48
Frontier Bronze Corp. 382

G

General Electric Co. 91
General Electric Co., X-Ray Dept. 40
Giffels & Vallet, Inc. 305

INDEX

Goodyear Tire & Rubber Co., The 29
Gordon, Claud S., Co. 225
Great Western Manufacturing Co. 238

H

Harnischfeger Corp. 339
Harrison Machine Co. 370
Hauck Manufacturing Co. 372
Hercules Powder Co., Inc. 61
Herman Pneumatic Machine Co. 212, 213
Hewitt-Robins, Inc. 52
Hickman, Williams & Co., Inc. 106, 320
Hines Flask Co., The 50, 51
Homer Manufacturing Co., Inc., The 70
Hough, Frank G., Co., The 35
Houghton, E. F., & Co. 279
Hydro-Blast Corp. 270, 271

I

Illinois Clay Products Co. 249
Imperial Belting Co. 10
Independent Pneumatic Tool Co. 108, 109
Industrial Equipment Co. 19
Industrial Fabricating, Inc. 243
Industrial Pattern Works 275
Ingersoll-Rand 309
International Graphite & Electrode Corp. 227
International Minerals & Chemical Corp., Eastern Clay Products Dept. 205
International Molding Machine Co. 264, 265
International Nickel Co., Inc., The 1
Ironton Fire Brick Co., The 90

J

Jackson Iron & Steel Co., The 373
Jeffrey Manufacturing Co., The 14, 15
Jobbins, William F., Inc. 183
Johns-Manville 239, 256
Johnson-March 373
Johnston Mfg. Co. 349
Joy Manufacturing Co. 223

K

Keokuk Electro-Metals Co. 251
Keystone Refractories Co. 381
Kirk & Blum Manufacturing Co., The 104
Knight, Lester B., & Associates, Inc. 365
Kuhlman Electric Co., Detroit Electric Furnace Div. 86, 87
Kux Machine Co. 341
Kwik-Mix Co. 322

L

Lanly Co., The 64
Lavin, R., & Sons, Inc. 96
Leeds & Northrup Co. 38
Lindberg Engineering Co., Lindberg-Fisher Div. 21
Lindberg-Fisher A Div. of Lindberg Engineering Co. 21
Linde Air Products Co. A Div. of Union Carbide & Carbon Corp. 93
Link-Belt Co. 71
Lithium Corp. of America Inc., Metalloy Corp. Div. 366
Logan Co. 207
Logan Engineering Co. 387

Mc

McDougall-Butler Co., Inc. 377

M

MacLeod Co., The 337
Macklin Co. 215
Main Belting Co. 371
Mall Tool Co. 368
Markal Co. 353
Marshall, L. H., Co. 250
Master Pneumatic Tool Co., Inc., The 376
Mathieson Chemical Corp. ..... Inside Front Cover
Max Manufacturing Co. 385
Metal Blast, Inc. 219
Metalloy Corp. Div., Lithium Corp. of America Inc. 366
Michigan Oven Co. 287
Milwaukee Chaplet & Manufacturing Co. 274
Modern Equipment Co. 412
Molybdenum Corporation of America 80
Monk Tool Co., The 386
Monsanto Chemical Co., Plastics Div. 208
Moulders' Friend, The 343
Muller Machinery Co., Inc. 385
Multiplex Machinery Corp. 269
Murphy, Jas. A., & Co. 372

N

National Carbon Co. A Div. of Union Carbide & Carbon Corp. 173
National Engineering Co. 16, 17
National Forge & Ordnance Co. 374
National Lead Co., Baroid Sales Div. 312
National Lead Co., Titanium Alloy Manufacturing Div. 117
National Metal Abrasive Co. 106
National Pigment Co. 110, 111
Neff & Fry Co., The 378
New England Coke Co. 278
New Haven Vibrator Co. 278
Newaygo Engineering Co. 310, 311
Nicholls, Wm. H., Co., Inc. 112, 113
Nichols Engineering & Research Corp. 100
North American Manufacturing Co., The 247
Norton Co. 22, 42, 43, 56, 57

O

Obermayer, S., Co., The 299
Ohio Crankshaft Co., The 81
Ohio Electric Manufacturing Co., The 384
Oliver Machinery Co. 379
Orefraction, Inc. 261
Osborn Manufacturing Co., The 277, 296, 297
Ottawa Silica Co. 356

P

P.M.S. Co., The 383
Pangborn Corp. 6, 7, 79
Pekay Machine & Engineering Co. 89
Pelron Corporation 240
Penn Iron Works, Inc. 288
Pennsylvania Foundry Supply & Sand Co. 258
Pennsylvania Glass Sand Corp. 59
Peters-Dalton, Inc. 263
Petersen Oven Co., The, Stroman Furnace & Engineering Co. Div. 13
Pettibone Mulliken Corp., Beardsley & Piper Div. 232, 233
Philadelphia Coke Co. 373
Pickands Mather & Co. 201
Picker X-Ray Corp. 30
Pittsburgh Coke & Chemical Co. 326
Pittsburgh Crushed Steel Co. 284
Pittsburgh Lectromelt Furnace Corp. 245
Pittsburgh Metals Purifying Co. 211
Plaster Process Castings Co. 375
Posey Iron Works, Inc. 333
Pressed Steel Flasks, Inc. 295
Pressure Match Plate Co., Inc. 384
Producers Core Sand Corp. 384
Puro-Seal Co., The 377
Pyrometer Instrument Co., The 386

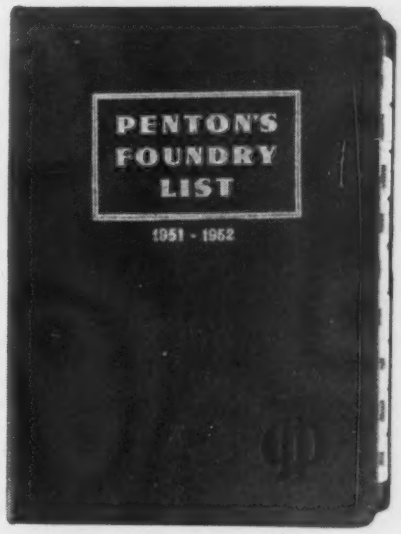
R

Radium Chemical Co., Inc. 273
Ready-Power Co., The 360
Reda Pump Co. 321
Redford Iron & Equipment Co. 191
Reed Roller Bit Co., Cleco Div. 185
Reichert, W. G., Engineering Co., Automatic Foundry Equipment Div. 356
Remmey, Richard C., Son Co. 266
Republic Coal & Coke Co. 380
Richards-Wilcox Manufacturing Co. 88
Rietz Lumber Co. 292
Robeson Process Co. 374
Roots-Connersville Blower Corp. 315
Ross, J. O., Engineering Corp. 376
Roto-Finish Co. 346
Rotor Tool Co., The 105
Royer Foundry & Machine Co. 171
Royersford Foundry & Machine Co. 382

Continued on Page 410

LIST

of today's Foundry Market



This volume helps you to know the foundry market thoroughly. The new 1951-52 Penton's foundry list provides you with the most complete information available anywhere on the 5,867 foundries in the U.S. and Canada. It tells *who* they *are*, *where* they are located, *what* they melt, how *big* they are and what departments they operate.

Many sales managers and buyers of castings say they could not get along without it. The price is reasonable. For descriptive literature, write to—

FOUNDRY

Book Department
Penton Publishing Company
Cleveland 13, Ohio

ATLANTIC CITY—birthplace of Miss America and convention spot of foundrymen (MR. AMERICA) May 1 to 7.

Dear Reader:

Were you there . . . . four years ago when foundrymen descended on Philadelphia for the last eastern convention?

The cherry blossoms and spring flowers were in full bloom. A good time was had by all and much new equipment was shown for the first time. As you recall, a political convention followed us into the city and (they say) the cab drivers' outlook on life hasn't been the same since. Seems as though you were a cab-loving lot and seldom walked when you could ride. "Ah, those foundrymen . . . there was a convention!"

Jack Ahrens, Eastern manager of FOUNDRY, and your correspondent were in Atlantic City recently (making FOUNDRY's preparations to welcome you) and found much evidence of activity designed to make your visit there a pleasant one. At the Convention Bureau, Mr. Wayne Stetson's secretary (Miss Redfield) and Miss Yarnel of the Housing Bureau were mighty cordial and problem-solvers par excellence. We hope no one of you will have room-troubles and doubt that you will.

By the way, have YOU ever been to Atlantic City? Being a country-boy at heart myself, the "wide-open spaces" of the ocean as viewed from a miles-long boardwalk proved fascinating and relaxing. There must be wider, longer beaches elsewhere, and some of you (dear readers in distant parts of the world) might not be so impressed. If Atlantic City is as appealing in May as it was in late March, you will enjoy your trip to this year's convention.

Frank Steinebach's editorial team will be there early and stay late to bring you a word and picture of the May 1 to 7 event in FOUNDRY's special June post-convention issue. *This* great preconvention issue previews the Atlantic City affair in full detail. Note especially the fine assembly of news and information on foundry equipment, services and supplies. It is suggested that you observe the extent to which new and standard-lines equipment has been cataloged for your reference.

If you attend the convention, we extend a cordial welcome to the FOUNDRY booth where newly built (extra-soft) easy-chairs have been reserved for your comfort. All of us will be there to say "hello" with Rand Ebersole, Dave Gibbs, Mary Jane Kimpel, and Bettie Thompson on hand to greet you.

* * *

It's NEW . . . . another handy 40-page booklet entitled, "How to use the Cupola." Many of you liked our pocket-sized GLOSSARY OF FOUNDRY TERMS. This newest booklet on cupola operation is a collection of 13 articles which appeared serially in FOUNDRY recently and is available through our circulation department at a cost of $1.00.

* * *

Help! Help! (as Arch Ward in the *Chicago Tribune* says) our column depends upon its friends. We have thoroughly enjoyed correspondence with those of you who have written to us (especially those who have sent "idea" and "shop kink" letters which we have promptly presented to the Editor). We like to write, we like to *receive* letters. Write soon, won't you?

Cordially,

Business Manager,
FOUNDRY

April 22, 1952

S

Safety Clothing & Equipment Co. 234
Sargent Sand Co. 378
Schneible, Claude B., Co. 32
Schrader's, A., Son Div. of Scovill Manufacturing Co., Inc. 179
Schramm, Inc. 58
Scientific Cast Products Corp., The 286
Scovill Manufacturing Co., Inc., A. Schrader's Son Div. 179
Semet-Solvay Div., Allied Chemical & Dye Corp. 273
Simonds Abrasive Co. 12
Simplicity Engineering Co. 187
Sly, W. W., Manufacturing Co., The 254
Smillie, C. M., & Co. 372
Smith, Werner G., Inc. 289
Smith Oil & Refining Co. 199
Smooth-On Manufacturing Co. 380
Solvay Sales Div., Allied Chemical & Dye Corp. 220
Spencer Turbine Co., The 290
SPO, Inc. 330, 331
Standard Aluminum Co. 384
Standard Electrical Tool Co., The 244
Standard Horse Nail Corp. 338
States Engineering Corp. 217
Steel Shot & Grit Co. 284
Sterling Grinding Wheel Div., The 94, 95
Sterling Wheelbarrow Co. 119, 120
Stevens, Frederic B., Inc. ..... Inside Back Cover
Stroman Furnace & Engineering Co. Div. of The Petersen Oven Co. 13
Superior Flake Graphite Co. 354
Sutter Products Co. 351
Syntron Co. 332

T

Tabor Manufacturing Co., The 36, 37
Tamms Industries, Inc. 358
Titanium Alloy Manufacturing Div., National Lead Co. 117
Toledo Matchplate Co. 375
Towmotor Corp. 103
Tracerlab 381
Transall, Inc. 260
Turner & Haws Engineering Co., Inc. 369

U

Union Carbide & Carbon Corp., Bakelite Co. 18
Union Carbide & Carbon Corp., Electro Metallurgical Co. 54, 55
Union Carbide & Carbon Corp., Linde Air Products Co. 93
Union Carbide & Carbon Corp., National Carbon Co. 173
Union Steel Products Co. 267
United Compound Co. 338
United Oil Manufacturing Co. 101
United States Graphite Co., The, Div. of The Wickes Corp. 189
United States Rubber Co. 235, 307
United States Safety Service Co. 386
United States Steel Co., American Bridge Div. 379
United States Steel Corp., Subsidiaries 379
Universal Engineering Co. 53

V

Vanadium Corporation of America 193

W

Wadsworth Equipment Co. 377
Wellman Bronze & Aluminum Co., The 306
Wellman Engineering Co., The 386
Wellman Products Co. 336
Westover Engineers 97
Whiting Corp. 195
Wickes Corp., The, The United States Graphite Co., Div., ... 189
Wickland, A. A., & Co. 382
Wilkinson Equipment & Supply Corp. 332
Will, Arthur E. 377
Willson Products, Inc. 334
Woodward Iron Co. 177
Worthington Pump & Machinery Corp. 28

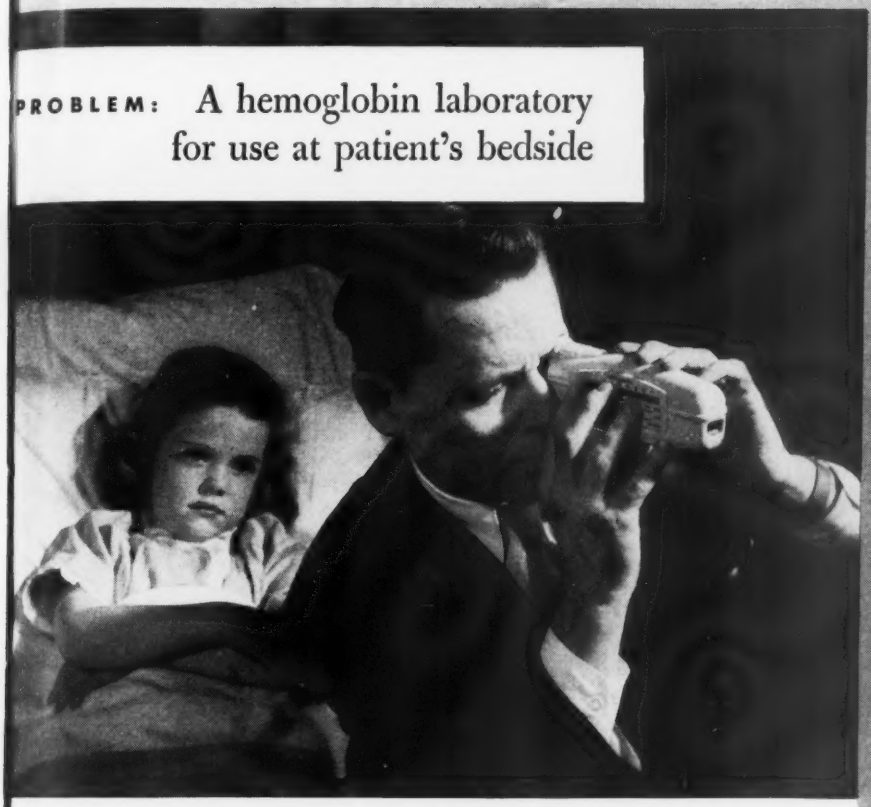
Table of Contents, Page 3

Classified Advertisers, 402 403, 404, 405, 406, 407

PROBLEM: Armor plate for eyes

ANSWER: If you dropped steel balls on *your* glasses, they'd shatter in dangerous splinters. AO safety-goggle lenses won't splinter. Scientists at American Optical devised a heat treatment that makes glass many times as strong, eyes safer.

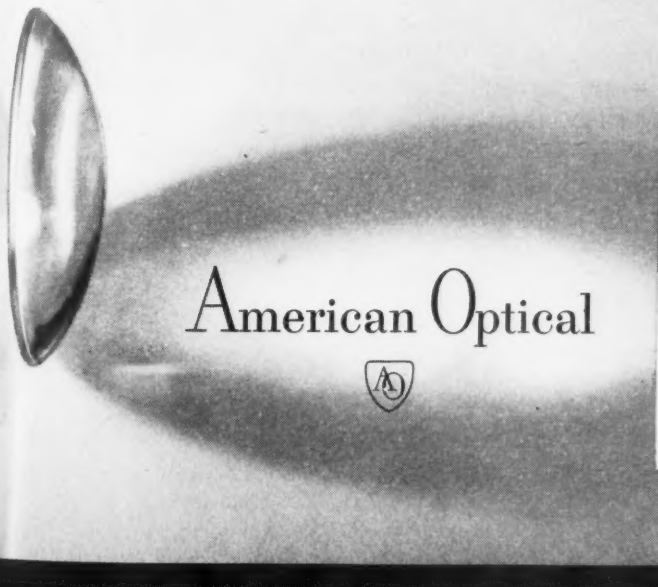
PROBLEM: A hemoglobin laboratory for use at patient's bedside



ANSWER: Today, a physician need not send blood samples to a laboratory for hemoglobin analysis and delay diagnosis. Within 3 minutes, he can read the answer in the Hb-Meter. This meter is so fast that a patient's condition can be watched during treatment. Heart of the instrument is an accurately polished glass wedge, graded in color, against which the blood sample can be matched. The Hb-Meter is a creation of American Optical Company.

PROBLEM: To keep movie film from catching fire

ANSWER: *Right,* film shielded by ordinary glass catches fire. *Left,* AO heat-absorbing glass prevents fire. This glass, developed for floods and projectors, absorbs 90% of heat from projected light, passes movie-film color in true values. Write us about your development problems. American Optical Company, 69 Vision Park, Southbridge, Mass.



American Optical

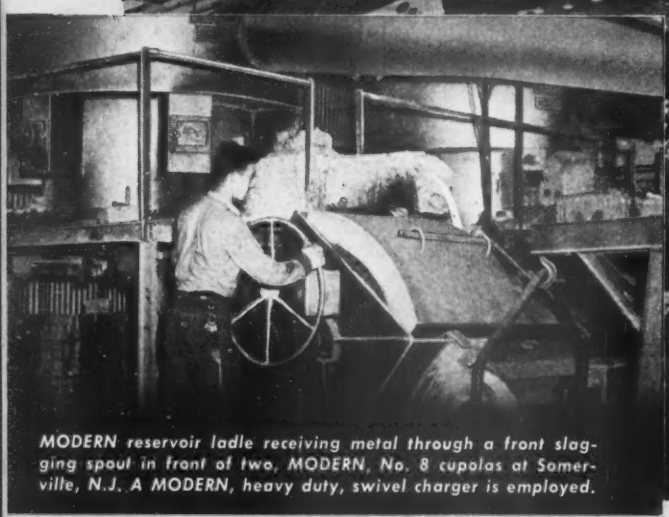
MODERN FOUNDRY EQUIPMENT

Atlantic City May 1 Through 7

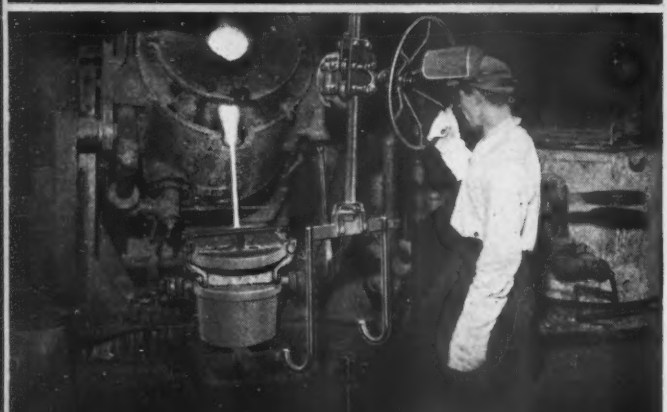
AT THE HEART OF THE SHOW

BOOTHS 710-809

126,000 square feet of exhibit space as set up for your pleasure by the American Foundrymen's Society.



MODERN reservoir ladle receiving metal through a front slagging spout in front of two, MODERN, No. 8 cupolas at Somerville, N.J. A MODERN, heavy duty, swivel charger is employed.



Receiving Ampco (Aluminum Bronze) at the electric furnace. Metal is transferred from dolly to mold, and poured, with a Model "E," MODERN Pouring Device.

Ever since the development of the one-man, mechanical POURING DEVICE — more than thirty years ago — MODERN EQUIPMENT products have helped to make easier all foundry work while boosting tonnages at the pay scales . . .

Several of these MODERN, pioneering developments will be on display at Atlantic City. And whether your special interest centers in a 6000 pound, geared, reservoir ladle or around a ladle of only 100 pounds capacity, to operate with detachable bail and Pouring Device, you'll find them at the show — UNDER POWER!

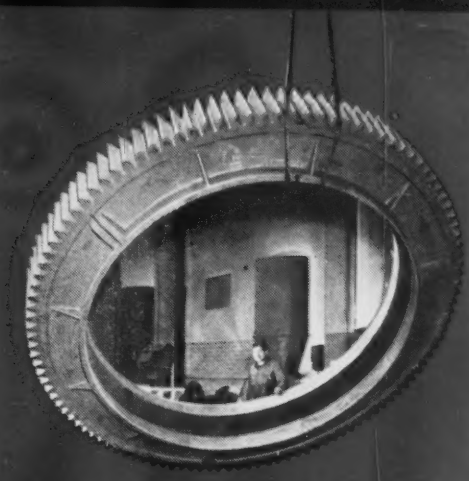
We'll be mighty happy to welcome you at the heart of the show in

BOOTHS 710 AND 809

MODERN EQUIPMENT COMPANY

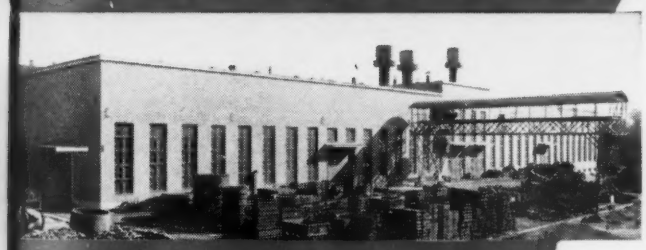
PORT WASHINGTON, WISCONSIN

Workman building open mold for the gear rim which weighs nearly one ton.



Huge gear rim of a barking drum for a pulp mill has diameter of 14½ feet.

STEVENS FACINGS Favored by Finns



Modern building which houses the foundry of Finnish manufacturer.

Teeth of gear rim were molded in cement sand coated with Stevens No. 114 Core Coating.

● Halfway around the world—in Tammerfors, Finland, to be exact—Stevens Foundry Facings are as popular with foundrymen as they are right here at home. The *Tammerfors Linne-och Fern-Manufaktur Aktie-Bolag*, a Finnish manufacturer of pulp and paper machinery and other heavy industrial equipment, reports that their use of Stevens No. 114 Core Coating has given them "very satisfactory" casting results. As proof, they forward these pictures, showing a typical product of their gray iron foundry.

Of course, there's no need to travel to Finland, or anywhere else, to find a foundry that is a confirmed booster of Stevens Facings. The chances are there's one right in your neighborhood. You see, Stevens has been furnishing foundrymen with the BEST in facings and supplies for nearly three-quarters of a century. And that vast experience is behind every Stevens product you order. Have your Stevens representative tell you about ALL the Stevens foundry items. There's no obligation. Call him today or write direct to *Frederic B. Stevens, Inc., Detroit 16, Michigan.*

Visit our exhibit at the International Foundry Congress and Show Atlantic City, May 1-7, 1952 BOOTH 1718

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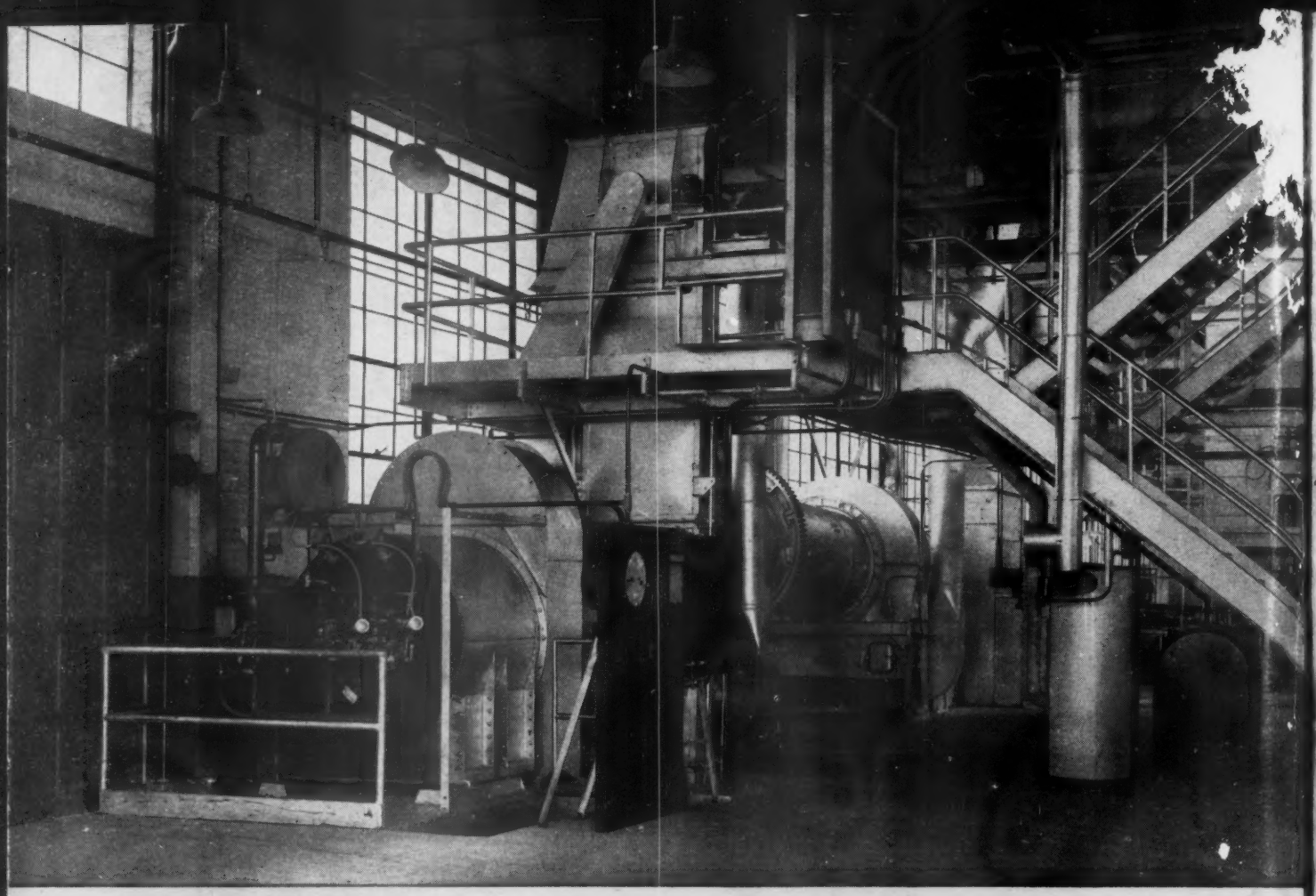
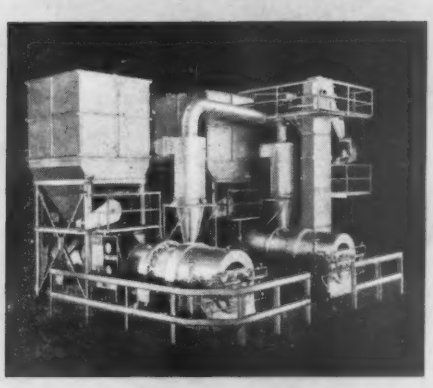
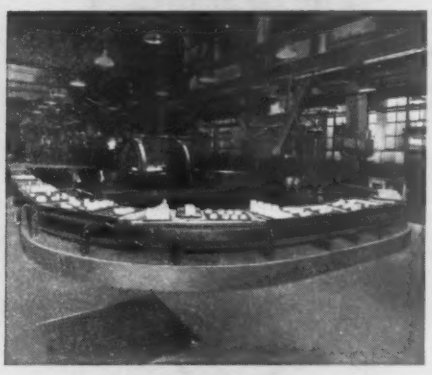




Complete Sand Drying and Handling Equipment Showing Discharge of Dried Sand to Core Room.



View in Core Room Showing Continuous Car Type Conveyor That Carries Cores to Ovens.

Sand Control

cuts core costs

● Drying your own core sand results in better deliveries and lower sand costs. It permits exact duplication of every mix — saves on binders — results in a uniform bake — constant core structure and reduces losses of both cores and castings.

Dryers or combination dryer-coolers — gas, or oil fired — complete with storage, feeding and all conveying facilities — large or small capacities to meet your requirements. The C. O. Bartlett & Snow Company, 6201 Harvard Avenue, Cleveland 5, Ohio.

DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

Increasing Productivity for People You Know